

VPDES PERMIT FACT SHEET

This document gives pertinent information concerning the reissuance of the VPDES permit listed below. This permit is being processed as a **minor municipal** permit. The effluent limitations contained in this permit will maintain the Water Quality Standards of 9 VAC 25-260-00 et seq. The discharge results from the operation of a sewage waste water treatment plant by a local public service authority facility. This permit action consists of reissuance of the permit for a term of five years with updated special conditions, and with limitations on pH, biochemical oxygen demand (BOD₅), total suspended solids (TSS), dissolved oxygen, ammonia, E. coli, total residual chlorine (TRC), copper, nickel and zinc. (SIC Code: 4952 - sewage treatment)

1. **Facility Name and Address:**

Ferrum STP - Ferrum Water and Sewage Authority, P. O. Box 40, Ferrum, VA 24088

Location: 330 Old Ferrum Road, south side of Route 684, approximately 2 mile northeast of intersection with Route 40, in the community of Ferrum, Franklin County, Virginia

2. **Permit No.** VA0029254

Existing Permit Expiration Date: January 25, 2009

3. **Owner Contact:** Mr. James "J.J." G. Keith II, Plant Administrator
Telephone No.: (540)365-2193

4. **Application Complete Date:** July 29, 2008

Permit Drafted By: Susan K. Edwards

Date: November 19, 2008

DEQ Regional Office:

Blue Ridge Regional Office

Reviewed By: Kip. D. Foster, BRRO Water Permit Manager Date: 11/24/08

Public Comment Period Dates: December 19, 2008 through January 18, 2009

5. **Receiving Stream Name:** Storey Creek (River mile: 9.78)

Basin: Roanoke River (4A) Sub-basin: Roanoke River Section: 6a

Class: III, Non-tidal Piedmont Zones Waters Special Standards: none

7-Day, 10-Year Low Flow (7Q10): 0.25 MGD 7Q10 High Flow months: Jan. - May

1-Day, 10-Year Low Flow (1Q10): 0.23 MGD 1Q10 High Flow months: Jan. - May

30-Day, 5-Year Low Flow (30Q5): 0.41 MGD Harmonic Mean Flow: 0.82 MGD

30-Day, 10-Year Low Flow (30Q10): 0.34 MGD

Tidal: No

303(d) Listed? Yes

Attachment A contains a copy of the flow frequency determination memorandum.

6. **Operator License Requirements:** Class II

7. **Reliability Class:** II

8. **Permit Characterization:**

☐ Private ☐ Federal ☐ State ☒ POTW ☐ PVOTW

☐ Possible Interstate Effect ☐ Interim Limits in Other Document

9. **Wastewater Treatment System:** Attachment A contains a copy of the treatment plant schematic and site visit report.

Outfall	Discharge Sources	Treatment	Design Flow
001	Domestic wastewater generated by approximately 5000 residents of the Ferrum community plus students & faculty at Ferrum College	Influent screening and grit removal, a pair of sequencing batch reactors, post-equalization, chlorine disinfection, chlorine contact tank; dechlorination, aeration & effluent metering. Also includes aerobic sludge digesters and sludge press.	400,000 gallons per day

10. **Sewage Sludge Disposal:** Dried sludge from the treatment plant's sludge press is disposed of at the Franklin County Landfill. A VPDES Sewage Sludge Application Form was submitted in the application for VPDES permit reissuance package.
11. **Discharge Location Description:** The treatment plant is southwest of Cooks Knob, on the south side of Route 684, northeast of the intersection of Route 684 with Route 40, in the community of Ferrum, in Franklin County. The plant is between Old Ferrum Road (Route 864) and Storey Creek. A portion of the USGS topographic map, which indicates the discharge location and other items of interest is included in **Attachment A**. There are no significant (large) dischargers to the receiving stream or water intakes within the immediate area.

Name of Topo: Ferrum (050A)

Discharge: N 36°55'35", E 80°00'35"

12. **Material Storage:** Sulfur dioxide for dechlorination, chlorine for disinfection and soda ash are stored in the chemical building. Chlorine gas is no longer used for disinfection. Polymer for sludge thickening is stored in the sludge dewatering building. No materials are stored uncovered in a location that exposes them to rainfall, which might present a risk of reaching State waters.

13. **Ambient Water Quality Information:**

The receiving water body is Storey Creek which is within Section 6a of the Roanoke River basin as listed in the State Water Control Board's Water Quality Standards, River Basin Section Tables (9 VAC 25-260-450). The receiving stream is Class III - Non-tidal Piedmont Zones Water and no special standards designated. The designation of NEW-1 only applies to discharges to Smith Mountain Lake and tributaries to the Roanoke River within Section 6a, which this discharge does not fall within. The outfall is at river mile 9.78.

The Ferrum STP falls into the Roanoke River basin/Storey Creek watershed (VAW-L14R). The receiving stream is in the 2006 list of Impaired Waters due to bacterial contamination, category 5A. The discharge is within the impaired segment of Storey Creek. Fecal coliform and E. coli bacteria cause the segment to fail to support the Clean Water Act recreational use goal. The Pigg River Bacteria TMDL Study, that included Storey Creek, has been completed and was approved by the EPA on Sept. 11, 2006. The final TMDL includes a waste load allocation for the discharge from the Ferrum STP in section 6.4.3. The Storey Creek Lower segment assessment begins at the discharge for Ferrum STP and ends at the Pigg River. The 2006 Fact Sheet for the segment identifies the primary source of the impairment as agricultural and urban non-point source runoff. The permit for this discharge includes limits and monitoring requirements in accordance with agency guidance for maintaining bacterial water quality. The 2006 Fact Sheet for the segment and an excerpt from the Pigg River TMDL are provided in **Attachment A**. A complete copy of the TMDL document is available at <http://www.deq.virginia.gov/tmdl/apptmdls/roankrvr/piggec.pdf>.

At the 1998 reissuance of the VPDES permit, the flow of the receiving stream was updated based on site specific monitoring data at the point of discharge. The DEQ Office of Water Quality Assessments and Planning prepared a Flow Frequency Determination Memorandum dated August 10, 1998. This Flow Frequency Memo has been updated based on the adjusted gauge flow data for the same reference stations used in the 1998 memo. The critical flow values of 2003 have been compared to those of 2008 for relative change in receiving stream critical flow values. Since 2003 critical flows have decrease slightly, with the 7Q10 dropping by almost 5% and the 1Q10 by 3%. Although this isn't much of a decrease the effluent limitations of the permit will be updated to correspond with the revised critical flows. A copy of the August 13, 2008 memo is provided in **Attachment A**.

DEQ stream monitoring station 4ASDA009.79 on Storey Creek is upstream of the discharge point from the Ferrum STP at the Route 623 Bridge over Storey Creek. STORET monitoring data from this station was used as representative of receiving water pH, temperature and hardness for water quality. 90th percentile pH and temperature and mean hardness data were taken from the data collected between February 2000 and June 2003. A summary of the data is provided in **Attachment A**.

Threatened and endangered species. Searches of DGIF (VA Dept. of Game & Inland Fisheries), DCR (VA Dept. of Conservation & Recreation) and USFWS (United States Fish & Wildlife Services) databases indicate that endangered or threatened species are not expected to be present in the mixing zone of the discharge. The DGIF database presents the Federal and State Threatened Roanoke logperch (*Percina rex*) and several invertebrates as likely species downstream of the discharge after Storey Creek flows into the Pigg River. This point is almost 10 miles from the discharge. The search report from the Virginia Department of Game and Inland Fisheries, the submittal package to DGIF, DCR & US Fish and Wildlife Service is found in **Attachment A**. An e-mail response was received from DGIF requesting, as they are currently doing for existing facilities using chlorine for disinfection, the facility convert to ultra-violet light for disinfection. At this time DEQ is not requiring facilities to make this change. No comments were received from DCR or USFWS.

14. **Antidegradation Review and Comments:** Tier I Tier II X Tier III

The State Water Control Board's Water Quality Standards includes an antidegradation policy (9 VAC 25-260-30). All state surface waters are provided one of three levels of antidegradation protection. For Tier I, or existing use protection, existing uses of the water body and the water quality to protect these uses must be maintained. Tier II water bodies have water quality that is better than the water quality standards. Significant lowering of the water quality of Tier II waters is not allowed without an evaluation of the economic and social impacts. Tier III water bodies are exceptional waters and are so designated by regulatory amendment. The antidegradation policy prohibits new or expanded discharges into exceptional waters.

The antidegradation review begins with Tier determination. The receiving waterbody, Storey Creek is listed and a TMDL has been developed for exceedance of the water quality criteria for failing to meet the recreational use, due to bacterial impairment. However, bacterial impairment cannot be used as a basis to reduce a waterbody from a Tier II to a Tier I designation.

The 1999 VPDES Permit reissuance included an anti-degradation evaluation for the proposed upgrade of the treatment plant to the current design flow of 0.4 MGD. That evaluation designated the receiving stream as a **Tier II** water and no significant degradation of existing quality is allowed.

For purposes of aquatic life protection in Tier II waters, "significant degradation" means that no more than 25 percent of the difference between the acute and chronic aquatic criteria values and the existing quality (unused assimilative capacity) may be allocated. For purposes of human health protection, "significant degradation" means that no more than 10 percent of the difference between the human health criteria and the existing quality (unused assimilative capacity) may be allocated.

The antidegradation baseline for aquatic life and human health are calculated for each pollutant as follows:

Antidegradation baseline (aquatic life) = 0.25 (WQS – existing quality) + existing quality

Antidegradation baseline (human health) = 0.10 (WQS – existing quality) + existing quality

Where:

"WQS" = Numeric criterion listed in 9 VAC 25-260-5 et seq. for the parameter analyzed

"Existing quality" = Concentration of the parameter being analyzed in the receiving stream

These "antidegradation baselines" become the new water quality criteria in Tier II waters and effluent limits for future expansions must be written to maintain the antidegradation baselines for each pollutant. The antidegradation baselines were calculated for the 1999 reissuance as described above but with additional information on receiving stream and effluent water quality data have been updated. The outfall 001 discharge is existing and there is no indication of any proposed increase in the discharge of pollutants via this outfall. As the facility is not proposing any increase in the loading of any pollutants over historical levels, permit limits are in compliance with antidegradation requirements set forth in the Water Quality Standard Regulation, 9 VAC 25-260-30. The antidegradation review and associated effluent limits analyses, below, were conducted as described in Guidance Memorandum 00-2011, dated August 24, 2000, and comply with the antidegradation policy contained in Virginia's Water Quality Standards set forth in 9 VAC 25-260-30.

15. **Site Visit:** Date: October 3, 2008

Performed by: Susan K. Edwards

Attachment A contains a copy of the site visit memorandum.

16. **Effluent Screening and Limitation Development:** In accordance with the January 25, 2004 VPDES permit effluent has been monitored for compliance with flow, pH, BOD₅, TSS, dissolved oxygen, copper, nickel, zinc, ammonia and chlorine limitations. Effluent limitations and monitoring requirements are based on Federal Effluent Guidelines 40 CFR 133, Virginia's water quality standards (9 VAC 25-260-5 et seq.) (specifically DEQ Guidance Memorandum 00-2011), the previous permit, the VPDES Permit Manual and best engineering judgment.

A review of effluent data from the last three-year period indicates that the discharge is well below the design/permitted flow for the plant of 0.40 MGD. Effluent quality has remained well within compliance limits for most parameters monitored. Compliance with the ammonia limit and total metals are a problem at time. See **Attachment A** for a summary of discharge monitoring data and effluent data collected as "Attachment A" to the 2004 permit. It should be noted that monthly monitoring of nickel and zinc began in January 2008 with the first data reported by February 10, 2008.

Effluent testing data submitted as part of the application and water quality standards data submitted during the term of the permit were reviewed to determine if there is "suitable data" for analysis. Suitable data is that which is quantifiable and for which there are water quality standards in the state. The evaluation is of parameters that are not currently limited in this permit to assess the need to include limit as part of this reissuance.

Application Data - pH, temperature, BOD₅, total suspended solids (TSS), ammonia, total residual chlorine (TRC), dissolved oxygen (DO), total kjeldahl nitrogen (TKN), nitrate plus nitrite nitrogen, oil and grease, phosphorus and total dissolved solids. Of these parameters ammonia, total kjeldahl nitrogen and nitrate plus nitrite nitrogen are limited by the ammonia as nitrogen limit in the permit that will continue with this reissuance. pH, TSS, DO and TRC are limited and will continue to be limited in the permit and the data submitted demonstrates compliance. Oil and grease analysis found none above detection level of 5.0 mg/l. Total phosphorus and total dissolved solids results were reported based on three analyses each. There are currently no Virginia Water Quality Criteria for surface waters in 9 VAC 25-260-140 for these parameters and therefore no limit evaluation is performed.

Water Quality Standards Monitoring (WQSM) from the 2004 permit (Attachment A to the Permit) - There were problems with the laboratories performing the required analysis. The effluent was to be sampled and analyzed once during the term for most pesticides and PCBs (EPA method 608), base neutral extractables, volatiles and extractable acids (EPA method 624 and 625) and specific metals. Analysis was in the form of dissolved metals to correspond with the Virginia Water Quality Criteria for surface waters of 9 VAC 25-260-140. All results were below the QL/SSTV for results that used the proper level of quantification. A copy of the results submitted is included in **Attachment A** of this Fact Sheet. Re-analysis of parameters that were not tested at the proper SSTV will be pursued as a matter of permit compliance. The permit includes a reopener that allows further evaluation if results warrant.

The STORET data from Station 4ASDA009.79 is used as representative receiving water 90th percentile values for pH and temperature and mean hardness. The station is located upstream of the discharge at the Route 623 bridge over Storey Creek. **Attachment A** contains a copy of the data from STORET that was used. The 90th percentile of pH data was 8.23 S.U. and 22.7 °C for temperature. The mean of the hardness data is 37.7 mg/l CaCO₃. STORET data is also used for existing levels of background nickel and zinc upstream of the discharge copper, nickel and zinc. A single dissolved result was found, taken on June 19, 2001, for copper of 0.7 µg/l, nickel of 0.3 µg/l and zinc at 9.9 µg/l.

A. **Mixing Zone** - The agency mixing model, MIX210, was used to confirm the percentage of the receiving stream flow can be used in the WLA calculations. The program indicated that 100% of the 7Q10 flow may be used for calculating chronic WLAs and 100% of the 1Q10 flow may be used for calculating the acute WLAs. A copy of the print out of the mixing run is enclosed in **Attachment B**.

B. Effluent Limitations for Conventional Pollutants

Flow - The treatment plant has a design capacity 0.40 MGD. The flow from the treatment plant is not limited but is reported monthly from continuous flow monitoring.

pH - Limitations for pH are **6.0 S.U. minimum** and **9.0 S.U. maximum** according to the WQS 9 VAC 25-260-50 as a Class III Non-tidal Piedmont Zones Waters and Federal Effluent Guidelines' secondary treatment requirements (40 CFR 133). Monitoring is once per day by grab sample.

Biological Oxygen Demand (BOD₅) and Dissolved Oxygen (DO) - Water Quality Management Plan (WQMP) Regulation 9 VAC25-720-80 became effective on Dec. 28, 2005. Table B lists Roanoke River Basin non-TMDL waste load allocations including the BOD load for Ferrum STP. See **Attachment B** for an excerpt from the WQMP. The WQMP limits monthly average BOD₅ load is set at **14.2 kg/day**, and a **9.3 mg/l** concentration at the design flow of 0.40 MGD. The weekly average load and concentration are limited to **21.3 kg/day** and **14.0 mg/l** respectively. The BOD₅ loads are written as whole numbers on the limitations page in accordance with GM 06-2016. The Dissolved Oxygen limit of the existing permit will remain as a minimum of **6.0 mg/l**. Monitoring for BOD₅ is required three days per week of an 8-hour composite sample and for DO is once per day by grab sample. In addition, the facility is to meet a minimum technology based requirement for 85% removal efficiency for BOD₅.

Total Suspended Solid (TSS) - Secondary treatment standards as mandated by the federal technology-based guidelines (40 CR Part 133.102) are applicable to the TSS limit. Effluent limits of **30 mg/l** as a monthly average and **45 mg/l** as a weekly average have been required for TSS. Monitoring of TSS is at three days per week of an 8-hour composite sample. In addition, the facility is to meet a minimum technology based requirement for 85% removal efficiency for TSS.

Bacterial Water Quality - The freshwater bacteria standards bases on E. coli (9 VAC 25-260-170.A) became effective on January 15, 2003 as part of the Water Quality Standards (WQS), along with a revised disinfection policy (9 VAC 25-260-170.B). The Regulation changes the indicating organism of bacterial contamination from fecal coliform to E. coli. In accordance with Guidance Memo 03-2007, the Ferrum STP performed a demonstration study prior to the 2004 reissuance. Chlorine has been used as a surrogate for demonstrating compliance with bacterial limitations. However, the treatment plant discharge has been given an allocation in the bacterial TMDL for the Pigg River. See **Attachment A** for a copy of the TMDL allocation table listing the discharge. The applicable water quality standard for E. coli is a monthly average, calculated as a geometric mean, of **126 N/100 ml**. Proper disinfection and compliance with the water quality standards will be assured with twice per month E. coli monitoring in accordance with the recommendations in the VPDES Permit Manual. Disinfection requirements (residual chlorine monitoring) are included and reported on the Discharge Monitoring Report. Final effluent TRC is discussed under the Toxics heading below.

C. Effluent Limitations for Toxic Pollutants - The 1999 permit reissuance included an antidegradation evaluation of the expanded wastewater treatment plant. Due to new lower flows and additional effluent and receiving stream water quality data all existing limits have been reevaluated. Copper, nickel, zinc, chlorine and ammonia limits are carried forward in this permit but are revisited to determine if they are adequate to protect water quality based on lower critical flow values:

The current anti-degradation wasteload allocation (AWLA) spreadsheet (MSTRANTI draft k) was used to validate the adequacy of the limits. There were no new parameters for which there is "suitable data" as noted earlier in this Fact Sheet. Receiving stream pH, temperature and hardness data were taken from the STORET station just upstream of the discharge, Station 4ASDA009.79. Effluent pH and temperature data was taken from plant records over the last three years. Effluent hardness data was collected several times over the last ten years. A copy of the effluent data used as well as the AWLA spreadsheet and support output are included in **Attachment B**.

Ammonia - The antidegradation ammonia limit is tiered between high-flow months of January through May and low-flow months of June through December. The limit has been reevaluated in accordance with Guidance Memorandum 00-2011 using AWLAs based on revised receiving stream flows. A

default effluent data point of 9 mg/l was entered into the STATS.exe 2.0.4 program to establish a limit, which will protect the receiving water body from the reasonable potential to exceed the water quality standards. The high-flow limit is **3.2 mg/l** and low-flow limit is **1.6 mg/l** as both a **maximum weekly average** and **monthly average**. Sampling is to be by eight-hour composite at least once per month.

Total Residual Chlorine (TRC) - The treatment plant uses chlorination as the disinfection method. In addition to requirements of use of chlorine for bacterial disinfection, chlorine is limited as a toxic. The water quality based TRC limits have been reevaluated in accordance with Guidance Memo 00-2011 procedures using the revised AWLA spreadsheet, agency STATS.exe statistical software package together with one datum value of 20 mg/l (in accordance with GM #00-2011) to force the program to calculate the permit limits for TRC. The antidegradation chlorine limit is **6.6 µg/l** as a **maximum weekly average** and **3.3 µg/l** as a **monthly average**. Analysis is to be at least three/day at four-hour intervals by grab sample. The Special Condition for internal monitoring for disinfection is included in Part I of the permit. The number of excursions allowed within Part I.B.2. of the permit is based on the minimum of 3-times/day sampling and 30 days per month.

Copper, Nickel and Zinc limit development - In the 1999 reissuance a limit was established for copper prior to the plant expansion to 0.40 MGD. The 2004 reissuance, there was suitable data for analysis of the need for effluent limits for nickel and zinc. The agency software package STANDARD.EXE was used with copper and zinc data prior to the plant expansion to determine the expected value of the toxic in the stream prior to the expansion. Zinc data indicated that there was zinc in the effluent but not at levels to warrant a limit at the time. All nickel data prior to the plant expansion was below the SSTV of the monitoring. A copy of the output from STANDARD.exe are found in **Attachment B**. A baseline for copper, nickel and zinc are calculated in accordance with antidegradation: 25% of the difference between the existing condition and the water quality standard for each aquatic life parameter listed in 9 VAC 25-260-140;

$$\text{Baseline}_{\text{acute, chronic}} = 0.25 (\text{WQS} - \text{existing condition}) + \text{existing condition}$$

The WQS is taken from an anti-degradation waste load allocation (AWLA) spreadsheet that calculates the WQS of the mixed effluent considering the hardness for the metals. The AWLA spreadsheet is included in **Attachment B**.

The expected value, taken from STANDARD.EXE, is used in a mass balance calculation to determine the in-stream concentration (existing quality) at the edge of the mixing zone:

$$\text{Existing Condition} = \frac{(Q_r)(C_r) + (Q_w)(C_w)}{Q_r + Q_w}$$

Where Q_r = instream critical flow (7Q10 for chronic and 1Q10 for acute) in MGD

C_r = instream background concentration of toxic (from STORET data)

Q_w = design flow of the STP in MGD (prior to expansion = 0.25)

C_w = concentration in wastewater discharge, expected value

[Flows: 1Q10 = 0.229 MGD and 7Q10 = 0.254 MGD]

Copper - The Expected Value, C_w , from STANDARD.EXE = 14.88 µg/l

Acute standard = 9.4 µg/l

Chronic standard = 6.4 µg/l

$$\text{Existing Condition (acute)} = \frac{(Q_r)(C_r) + (Q_w)(C_w)}{Q_r + Q_w} = \frac{(0.229)(0.7) + (0.25)(14.88)}{0.229 + 0.25} = 8.10 \mu\text{g/l}$$

$$\text{Acute Baseline} = 0.25 (9.4 - 8.10) + 8.1 = 8.425 \mu\text{g/l}$$

$$\text{Existing Condition (chronic)} = \frac{(Q_r)(C_r) + (Q_w)(C_w)}{Q_r + Q_w} = \frac{(0.254)(0.7) + (0.25)(14.88)}{0.254 + 0.25} = 7.73 \mu\text{g/l}$$

$$\text{Chronic Baseline} = 0.25 (6.4 - 7.73) + 7.73 = 7.40 \mu\text{g/l}$$

Nickel - Because there was no detected effluent data from monitoring prior to the plant upgrade, the Expected Value, C_w , is zero. However, there is a single upstream data point to establish baseline conditions.

$$\text{Acute standard} = 130 \mu\text{g/l} \quad \text{Chronic standard} = 14 \mu\text{g/l}$$

$$\text{Existing Condition} = \frac{(Q_r)(C_r) + (Q_w)(C_w)}{Q_r + Q_w} = \frac{(0.229)(0.3)}{0.229 + 0.25} = 0.143 \mu\text{g/l}$$

(acute)

$$\text{Acute Baseline} = 0.25 (130 - 0.143) + 0.143 = 32.6 \mu\text{g/l}$$

$$\text{Existing Condition} = \frac{(Q_r)(C_r) + (Q_w)(C_w)}{Q_r + Q_w} = \frac{(0.254)(0.3)}{0.254 + 0.25} = 0.151 \mu\text{g/l}$$

(chronic)

$$\text{Chronic Baseline} = 0.25 (14 - 0.151) + 0.151 = 3.61 \mu\text{g/l}$$

Zinc - The Expected Value, C_w , from STANDARD.EXE = 27.5 $\mu\text{g/l}$

$$\text{Acute standard} = 85 \mu\text{g/l} \quad \text{Chronic standard} = 84 \mu\text{g/l}$$

$$\text{Existing Condition} = \frac{(Q_r)(C_r) + (Q_w)(C_w)}{Q_r + Q_w} = \frac{(0.229)(9.9) + (0.25)(27.5)}{0.229 + 0.25} = 19.1 \mu\text{g/l}$$

(acute)

$$\text{Acute Baseline} = 0.25 (85 - 19.1) + 19.1 = 35.6 \mu\text{g/l}$$

$$\text{Existing Condition} = \frac{(Q_r)(C_r) + (Q_w)(C_w)}{Q_r + Q_w} = \frac{(0.254)(9.9) + (0.25)(27.5)}{0.254 + 0.25} = 18.63 \mu\text{g/l}$$

(chronic)

$$\text{Chronic Baseline} = 0.25 (84 - 18.63) + 18.63 = 35.0 \mu\text{g/l}$$

The baselines become the new antidegradation standards and all wasteload allocations (WLAs) must be calculated using the baselines instead of "routine" water quality standards. The antidegradation version of the spreadsheet (AWLA) was used for calculations. This spreadsheet uses receiving stream, plant effluent data and the baselines established above to establish AWLAs for the expanded plant. The AWLA spreadsheet calculates the waste load allocations as follows:

$$\text{AWLA}_{\text{acute}} = \frac{C_o(Q_w + Q_r) - C_r(Q_r)}{Q_w} \quad \text{and} \quad \text{AWLA}_{\text{chronic}} = \frac{C_o(Q_w + Q_r) - C_r(Q_r)}{Q_w}$$

Where Q_r = instream critical flow (7Q10 for chronic and 1Q10 for acute) in MGD

C_r = instream background concentration of toxic (from STORET data)

Q_w = design flow of the STP (now use the 0.40 MGD)

C_w = concentration in wastewater discharge, expected value

C_o = the instream WQS existing condition, for antidegradation this is the baseline

For dissolved copper the AWLAs are:

$$\text{AWLA}_{\text{acute}} = \frac{8.425 (0.40 + 0.229) - 0.7 (0.229)}{0.40} = 12.85 \mu\text{g/l}$$

$$\text{AWLA}_{\text{chronic}} = \frac{7.40 (0.40 + 0.254) - 0.7 (0.254)}{0.40} = 11.65 \mu\text{g/l}$$

For dissolved nickel the AWLAs are:

$$\text{AWLA}_{\text{acute}} = \frac{32.6 (0.40 + 0.229) - 0.3 (0.229)}{0.40} = 51.09 \mu\text{g/l}$$

$$\text{AWLA}_{\text{chronic}} = \frac{3.61 (0.40 + 0.254) - 0.3 (0.254)}{0.40} = 5.71 \mu\text{g/l}$$

For dissolved zinc the AWLAs are:

$$\text{AWLA}_{\text{acute}} = \frac{35.6 (0.40 + 0.229) - 9.9 (0.229)}{0.40} = 50.3 \mu\text{g/l}$$

$$\text{AWLA}_{\text{chronic}} = \frac{36.0 (0.40 + 0.254) - 9.9 (0.254)}{0.40} = 52.57 \mu\text{g/l}$$

The AWLA values were entered into the STATS.exe statistical software to determine based on the data collected if a lower limit is needed. The statistical evaluation sets slightly lower limits for the zinc and nickel. The output files are included in **Attachment B**.

Copper - The antidegradation copper limit from the 1999 reissuance was 12.4 µg/l for both a **maximum weekly average** and **monthly average**. The reevaluation allows the limit to be relaxed slightly to **12.8 µg/l**. This change is not considered backsliding as discussed in part 18 of this Fact Sheet. Analysis is to be at least once per month of a grab sample.

Nickel - The antidegradation nickel limit from the 2004 reissuance was 8.46 µg/l for both a **maximum weekly average** and **monthly average**. The reevaluation sets the limit at **8.36 µg/l**. Analysis is to be at least once per month of a grab sample.

Zinc - The antidegradation zinc limit from the 2004 reissuance was 53.8 µg/l for both a **maximum weekly average** and **monthly average**. The limit reevaluation would set the limit at **50.3 µg/l**. Analysis is to be at least once per month of a grab sample.

EPA requires that all water quality based metals limit monitoring be in total form rather than in dissolved.

Table II - Basis for Effluent Limitations

PARAMETER	BASIS
Flow	NA – monitoring only
pH	1 (40 CFR 133) & 2 (9 VAC 25-260-50)
BOD ₅	2 – WQM Plan (9 VAC25-720-80 Table B)
TSS	1 - Secondary Treatment (40 CFR 133)
Chlorine	2 - WQS toxic evaluation
Ammonia as nitrogen	2 – WQS toxic evaluation
Copper, Nickel & Zinc	2 - WQS toxic evaluation metals
E. coli	2 - WQS bacteria (9 VAC 25-260-170)

1. Federal Effluent guidelines – cite CFR
2. Water Quality-Based Limits: - show calculations or cite WQM plan reference
3. Best Engineering Judgment: - provide narrative rationale
4. Other (e.g. wasteload allocation model): - specify & document with model output or WLA from TMDL or basin plan

17. **Basis for Sludge Use and Disposal Requirements:** A VPDES Sewage Sludge Application Form was submitted in the application package related to handling of dewatered sludge from the sludge press. The Ferrum Water and Sewage Authority staff transports the dewatered sludge on an as-needed basis to the Franklin County Landfill. Approximately weekly during the school year. A Sludge Reopener special condition is included in the event regulations regarding sludge change to affect this type of operation.
18. **Antibacksliding Statement:** The anti-backsliding requirements set forth in 9 VAC 25-31-220.L.2.b.(1) of the VPDES permit regulations address acceptable circumstances when water quality based effluent limitations may be made less stringent when a VPDES permit is reissued. All limitations except for the copper limit are as stringent as the previous permit. The reevaluation of the copper limit based on new receiving water body flows, pH, temperature and hardness data is “information which was not available at the time of issuance and which would have justified the application of a less stringent effluent limitation” in accordance with VPDES Regulations 9 VAC 25-31-220 L.2.b.(1) and agency guidance #00-2011. Therefore, reevaluation of the copper limit, as discussed in section 16 of this Fact Sheet, resulting in a lowering of the limitations is not backsliding.
19. **Compliance Schedule:** (9 VAC 25-31-250) There are no new or significantly lower limits included in the reissued permit that would warrant a compliance schedule.

20. **Special Conditions:** A brief rationale for each special condition contained in the permit is given below.

- a. **Additional Total Residual Chlorine (TRC) Limitations and Monitoring Requirements (Part I.B.)** - Rationale: Required by Sewage Collection and Treatment Regulations, 9 VAC 25-790, bacteria standards; other waters. Also, 40 CFR 122.41(e) requires the permittee, at all times, to properly operate and maintain all facilities and systems of treatment in order to comply with the permit. This ensures proper operation of chlorination equipment to maintain adequate disinfection.
- b. **95% Capacity Reopener (Part I.C.1.)** - Rationale: Required by 9 VAC 25-31-200 B2 for all POTW and PVOTW permits.
- c. **Indirect Dischargers (Part I.C.2)** - Rationale: Required by VPDES Permit Regulation, 9 VAC 25-31-200 B 1 for POTWs and PVOTWs that receive waste from someone other than the owner of the treatment works.
- d. **CTC, CTO Requirement (Part I.C.3)** - Rationale: Required by Code of Virginia § 62.1-44.19; Sewage Collection and Treatment Regulations, 9 VAC 25-790.
- e. **O&M Manual Requirement (Part I.C.4)** - Rationale: Required by Code of Virginia § 62.1-44.19; Sewage Collection and Treatment Regulations, 9 VAC 25-790; VPDES Permit Regulation, 9 VAC 25-31-190 E.
- f. **Licensed Operator Requirement (Part I.C.5)** - Rationale: The VPDES Permit Regulation, 9 VAC 25-31-200 D and the Code of Virginia § 54.1-2300 et seq, Rules and Regulations for Waterworks and Wastewater Works Operators (18 VAC 160-20-10 et seq.), require licensure of operators. This Special Condition requires staffing with an operator with a **Class II** license.
- g. **Reliability Class (Part I.C.6)** - Rationale: Required by Sewage Collection and Treatment Regulations, 9 VAC 25-790 for all municipal facilities. The Reliability Class has been designated as **Class II** in agreement with the OWE recommendation for the facility.
- h. **Sludge Reopener (Part I.C.7)** - Rationale: Required by VPDES Permit Regulation, 9 VAC 25-31-220 C 4 for all permits issued to treatment works treating domestic sewage.
- i. **Compliance Reporting Under Part I A and B (Part I.C.8)** - Rationale: Authorized by VPDES Permit Regulation, 9 VAC 25-31-190 J 4 and 220 I. This condition is necessary when toxic pollutants are monitored by the permittee and a maximum level of quantification and/or a specific analytical method is required in order to assess compliance with a permit limit or to compare effluent quality with a numeric criterion. The condition also establishes protocols for calculation of reported values.
- j. **Sludge Use and Disposal (Part I.C.9.)** - Rationale: VPDES Permit Regulations section 9 VAC 25-31-100 P: 220 B 2; and 420 through 720, and 40 CFR Part 503 require all treatment works treating domestic sewage to submit information on sludge use and disposal practices and to meet specified standards for sludge use and disposal. This special condition clarifies that the Sludge Management Plan approved with the issuance of this permit is an enforceable condition of the permit. Technical requirements may be derived from the VPA Permit Regulations, 9 VAC 25-32-10 et seq.
- k. **Infiltration and Inflow (I/I) Reduction Plan (Part I.C.10.)** - Rationale: The 1994 VPDES permit included a condition requiring the permittee to conduct a study which identified sources of I/I and make recommendations for corrective action. The study was submitted and the work of the corrective action plan (CAP) is ongoing. The special condition requires continued work in accordance with that I/I CAP. An annual report requirement has been added to the condition from that of the 1999 permit reissuance.
- l. **Total Maximum Daily Load (TMDL) Reopener (Part I.C.11.)** - Rationale: Section 303(d) of the Clean Water Act requires that total maximum daily loads (TMDLs) to be developed for streams listed as impaired. This special condition is to allow the permit to be reopened if necessary to bring it into compliance with any applicable TMDL approved for the receiving stream. The re-opener recognizes that, according to section 402(o)(1) of the Clean Water Act, limits and/or conditions may be either more or less stringent than those contained in this permit. Specifically, they can be relaxed if they are the result of a TMDL, basin plan, or other wasteload allocation prepared under section 303 of the Act.

- m. **Water Quality Criteria Monitoring (Part I.C.12.)** - Rationale: State Water Control Law § 62.1-44.21 authorizes the Board to request information needed to determine the discharge's impact on State waters. States are required to review data on discharges to identify actual or potential toxicity problems, of the attainment of water quality goals, according to 40 CFR Part 131, Water Quality Standards, subpart 131.11. To ensure that water quality criteria are maintained, the permittee is required to analyze the facility's effluent for the substances noted in Attachment A of the VPDES permit. In accordance with DEQ Guidance Memo #00-2011, monitoring is once-per-permit-term. Monitoring results are for use in the next permit reissuance.
- n. **Conditions Applicable to All VPDES Permits (Part II)** - Rationale: VPDES Permit Regulations, 9 VAC 25-31-190 requires all VPDES permits to contain or specifically cite the conditions listed.

21. Changes to the Permit:

Table III - Changes to limits from 2004 reissuance

Parameter Changed	Monitoring Requirement Changed		Effluent Limits Changed		Reason for Change	Date
	From	To	From	To		
BOD & TSS			kg/day	grams/day	Convert limits to whole units per GM06-2016	Oct 2008
TRC			55/68 µg/L	3.3/6.6 µg/L	Reevaluate limits new flow & water qty parameters	Oct 2008
Copper			12.4 µg/L	12.8 µg/L	Reevaluate limits new flow & water qty parameters	Oct 2008
Nickel			8.46 µg/L	8.36 µg/L	Reevaluate limits new flow & water qty parameters	Oct 2008
Zinc			53.8 µg/L	50.3 µg/L	Reevaluate limits new flow & water qty parameters	Oct 2008
Ammonia as N			10.7/6.9 mg/L	3.2/1.6 mg/L	Reevaluate limits new flow & water qty parameters	Oct 2008
E. coli	none	2/D-month	none	126 n/100 ml	WQS bacteria (9 VAC 25-260-170)	Oct 2008

Deletions or Modifications to special conditions from the 2004 permit reissuance (Special conditions are referenced by the numbering in the 2004 permit.)

- B. Additional TRC Limitations & Monitoring Requirements - replaced with updated condition in accordance with the latest revisions to the Agency's VPDES Permit Manual and Guidance Memo #03-2007 regarding Bacterial Water Quality standard.
- C. Compliance Schedule - removed as no longer required with metals limits in effect.
- D.1 Quantification Levels and Compliance Reporting under Part I.A and I.B. - included in updated special condition I.C.8. Compliance Reporting in accordance with the latest revisions to the VPDES Permit Manual.
- D.2. 95% Capacity Reopener - replaced with updated special condition I.C.1. in accordance with the latest revisions to the VPDES Permit Manual.
- D.3. Indirect Dischargers - relocated in conditions to I.C.2.
- D.4. CTC, CTO, O&M Manual Requirement - replaced with updated special conditions I.C.3. and C.4 in accordance with the latest revisions to the Permit Manual specifically separating CTC and CTO requirements from those addressed to O&M Manual requirements.
- D.5. Licensed Operator Requirement - renumbered as condition I.C.5.
- D.6 Reliability Class - renumbered as condition I.C.6.
- D.7. Sludge Reopener - renumbered as condition I.C.7.
- D.8. Sludge Use and Disposal - renumbered as condition I.C.9.
- D.9. I/I Reduction Plan renumbered as condition I.C.10.
- D.10. TMDL Reopener - renumbered as condition I.C.11.
- D.11. Water Quality Criteria Monitoring - replaced with updated special condition I.C.12. in accordance with the latest revisions to the VPDES Permit Manual.

Additions to the special conditions from the 2004 permit reissuance

There are no new special conditions added in accordance with the permit regulations, agency guidance and/or applicable portions of the VPDES Permit Manual.

22. **Variances/Alternate Limits or Conditions:** The permittee requested a waiver from some application testing requirements for reissuance of this permit. The request was to waive the analysis of effluent fecal coliform as the bacterial indicator in Section A.12 of EPA Form 2A. The information is not needed as the bacterial Water Quality indicator species is now *E. coli*. Therefore a waiver of this application item was granted.

No variances or alternatives to required permit conditions/limitations are known to be within the permit. No variances from technology guidelines or water quality standards or from VPDES permit manual guidance are known to be used in the development of this permit.

23. **Regulation of Users:** (9 VAC 25-31-280 B 9) There are no industrial users contributing to the treatment works. However, the Ferrum STP does serve Ferrum College. The Water and Sewage Authority maintains a good relationship with the College and to date has received cooperation in waste treatment related issues without any formal regulation between the two entities.

24. **Public Notice Information required by 9 VAC 25-31-280 B:**

All pertinent information is on file and may be inspected, and arrangements made for copying by contacting Susan K. Edwards at:

Virginia DEQ, Blue Ridge Regional Office, 3019 Peters Creek Road, Roanoke, VA 24019
Telephone no. (540)562-6700 or skedwards@deq.state.va.us

Persons may comment in writing or by e-mail to the DEQ on the proposed permit action, and may request a public hearing during this comment period. Comments shall include the name, address, and telephone number of the writer, and shall contain a complete, concise statement of the factual basis for comments. Only those comments received within this period will be considered. Requests for public hearings shall state the reason why a hearing is requested, the nature of the issues proposed to be raised in the public hearing, and a brief explanation of how the requester's interests would be directly and adversely affected by the proposed permit action. Following the comment period, the Board will make a determination regarding the proposed permit action. This determination will become effective, unless the DEQ grants a public hearing. Due notice of any public hearing will be given.

25. **Additional Comments:**

Previous Board Action - There have been no Board action related to this facility over the term of the current permit.

Staff Comments - The discharge is not controversial. The BRRO Water Permit Support Group notes that the discharge is in conformance with the existing planning document for the area and the bacterial TMDL. The permit does not include Toxicity Management Program monitoring in accordance with Guidance Memo #00-2012 as design flow is less than 1.0 MGD and the permit does not meet any other criteria that would prompt including effluent monitoring under this program.

Public Comments - No comments were received during the Public Notice.

Review of Reduced Monitoring Frequency - Guidance Memos 00-2011 and 98-2005 allows for reduced monitoring at facilities with excellent compliance histories. To qualify for consideration of reduced monitoring, the facility should not have been issued any letter of noncompliance (LON), notice of violation (NOV) or unsatisfactory laboratory determinations, or be under any Consent Orders, Consent Decrees, Executive Compliance Agreements, or related enforcement documents during the past three years. DEQ has issued two Warning Letters in 2006, one in 2007 and four in 2008 to Ferrum. The WLs in 2008 have been issued alleging exceedence of the effluent metals limits for nickel and zinc. The most recent WLS will

result in a Notice of Violation to be issued. It is believed that the metals limits are very difficult to meet and the plant continues to pursue measures to consistently comply with the low limitations. With these Warning Letters and the NOV within the last three years the facility is not eligible for reduced monitoring.

26. **303(d) List:** This facility discharges to Storey Creek. As noted in section 13 of this Fact Sheet, the Ferrum STP falls into the Roanoke River basin/Storey Creek watershed (VAW-L14R). The receiving stream is in the 2006 list of Impaired Waters due to bacterial contamination, category 5A. The discharge is within the impaired segment of Storey Creek. Fecal coliform and E. coli bacteria cause the segment to fail to support the Clean Water Act recreational use goal. The Pigg River Bacteria TMDL Study, that included Storey Creek, has been completed and was approved by the EPA on Sept. 11, 2006. The final TMDL includes a waste load allocation for the discharge from the Ferrum STP in section 6.4.3. The Storey Creek Lower segment assessment begins at the discharge for Ferrum STP and ends at the Pigg River. The 2006 Fact Sheet for the segment identifies the primary source of the impairment as agricultural and urban non-point source runoff. The permit for this discharge includes limits and monitoring requirements in accordance with agency guidance for maintaining bacterial water quality. The 2006 Fact Sheet for the segment and an excerpt from the Pigg River TMDL are provided in **Attachment A**. A complete copy of the TMDL document is available at <http://www.deq.virginia.gov/tmdl/apptmdls/roankrvr/piggec.pdf>. The discharge does include disinfection of the treated effluent. The permit does include a limit for bacterial water quality for E. coli with chlorine disinfection as a surrogate for compliance in accordance with DEQ GM#03-2007.

**VPDES Permit VA0029254
Ferrum STP
Reissuance January 2009**

ATTACHMENT A

1. Flow Frequency Memo, August 13, 2008
2. Schematic of treatment plant from O&M Manual.
3. Portion of Ferrum & Rocky Mount USGS quadrangles from application package
4. Search report from the Virginia Department of Game and Inland Fisheries, the submittal package to DGIR, DCR & US Fish and Wildlife Service
5. Excerpt from Bacterial TMDL for Pigg River, Snow Creek, Storey Creek and Old Woman's Creek approved Sept. 11, 2006 including allocation for discharge
6. Excerpt from 2006 Impaired Waters Fact Sheet, watershed description and bacterial impairment for the VAW-L14R-02-BAC Storey Creek watershed
7. Site visit report of October 6, 2008 (October 3, 2008 visit)
8. 3-year summary of effluent monitoring data - flow, pH, BOD5, TSS, DO, Ammonia, total recoverable Copper, total recoverable Nickel and total recoverable Zinc.
9. Water Quality Standards Monitoring data from 2004 reissuance submitted on form that was Attachment A to that permit reissuance.
10. Effluent temperature data from Jan. 2006 through July 2008:
11. Effluent hardness data and effluent dissolved nickel and zinc.
12. STORET data from Station 4ASDA009.79 for pH, DO, hardness and temperature, between February 2000 and June 2003.

MEMORANDUM
DEPARTMENT OF ENVIRONMENTAL QUALITY - WATER DIVISION
Water Permitting, Blue Ridge Regional Office
3019 Peters Creek Road, Roanoke, VA 24019-2738

SUBJECT: Flow Frequency Determination, Ferrum STP - #VA0029254
TO: Permit reissuance file
FROM: Susan K. Edwards, Environmental Engineer Sr., Water Permitting - WCRO
DATE: August 13, 2008

This memo supercedes that October 28, 2003 memo concerning the subject VPDES permit.

The Ferrum STP discharges to Storey Creek near Ferrum, VA. Stream flow frequencies are required at this site for the purpose of calculating effluent limitations for the VPDES permit.

The VDEQ conducted several flow measurements on the Storey Creek from 1994 to 1997 and a single data point was added in 2004. The measurements were made just above the Ferrum STP outfall at Ferrum, VA. The measurements correlated very well with the same day daily mean values from two continuous record gages; one on the Blackwater River near Rocky Mount, VA #02056900 and the second on the Pigg River near Sandy Level, VA #02058400. The measurements and daily mean values were plotted on a logarithmic graph and a best fit line was drawn through the data points using Excel computer software. The required flow frequencies from the reference gages were plotted on the regression line and the associated flow frequencies at the measurement site/discharge point were determined from the graph. The flow frequencies at the discharge point were determined by taking the average of the flow values obtained from each graph. The data for the reference gages and the measurement site/discharge point are presented below:

Blackwater River near Rocky Mount, VA (#02056900):

Drainage Area = 115 mi² (statistical period 1977 - 2003)

1Q30 = 4.6 cfs	Harm. Mean = 61 cfs
1Q10 = 8.4 cfs	High Flow 1Q10 = 32 cfs
7Q10 = 9.8 cfs	High Flow 7Q10 = 38 cfs
30Q10 = 16 cfs	High Flow 30Q10 = 51 cfs
30Q5 = 22 cfs	High flow months: Jan. - May

Pigg River near Sandy Level, VA (#02058400):

Drainage Area = 350 mi² (statistical period 1963 - 2003)

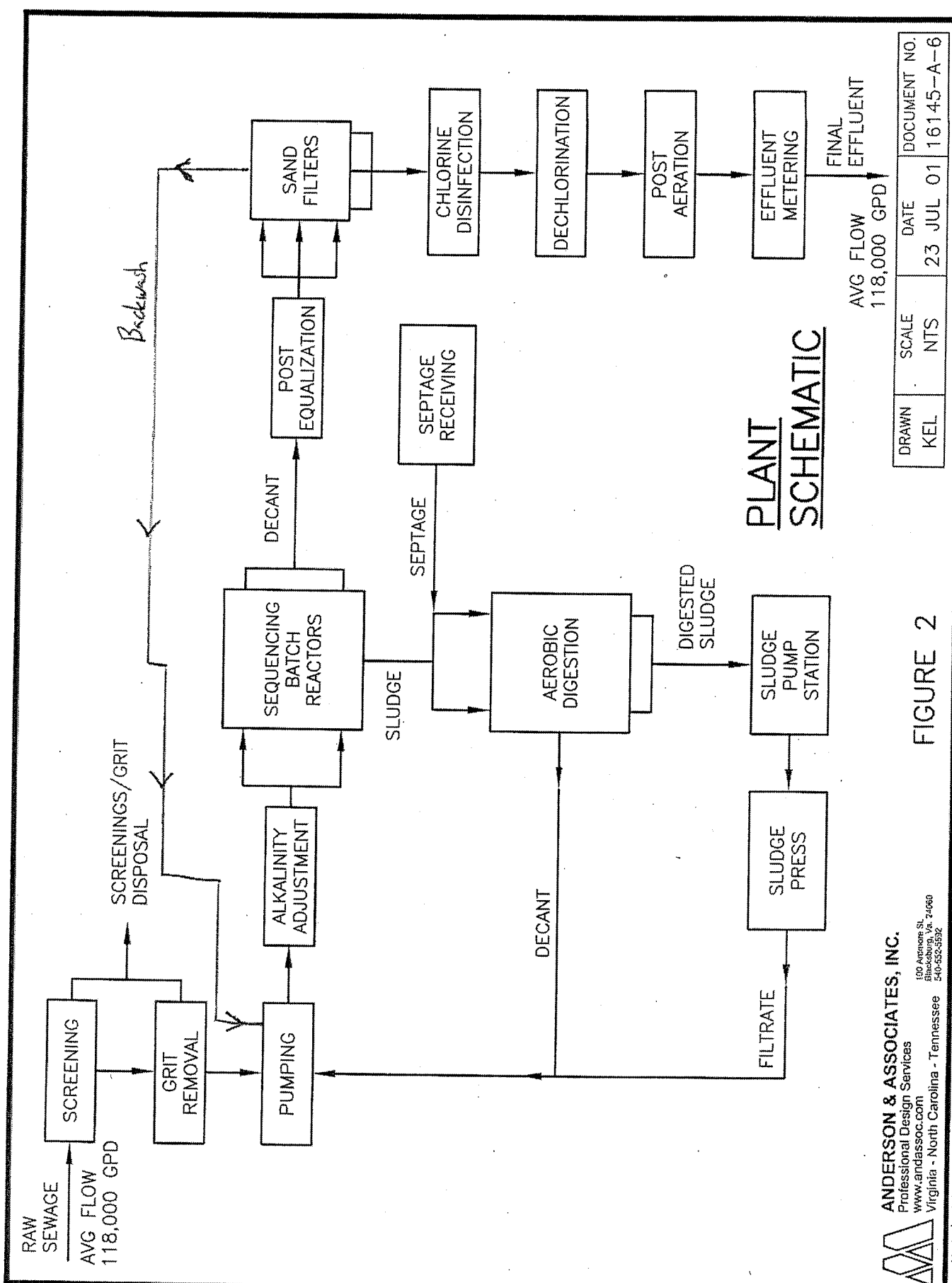
1Q30 = 27 cfs	Harm. Mean = 209 cfs
1Q10 = 42 cfs	High Flow 1Q10 = 123 cfs
7Q10 = 47 cfs	High Flow 7Q10 = 134 cfs
30Q10 = 65 cfs	High Flow 30Q10 = 171 cfs
30Q5 = 83 cfs	High flow months: Jan. - May

Storey Creek, above Ferrum STP, at Ferrum, VA (#02057620):

Drainage Area = 2.4 mi²

1Q30 = 0.24 cfs = 0.16 MGD	Harm. Mean = 1.26 cfs = 0.819 MGD
1Q10 = 0.36 cfs = 0.23 MGD	High Flow 1Q10 = 0.835 cfs = 0.540 MGD
7Q10 = 0.39 cfs = 0.25 MGD	High Flow 7Q10 = 0.914 cfs = 0.591 MGD
30Q10 = 0.52 cfs = 0.34 MGD	High Flow 30Q10 = 1.11 cfs = 0.715 MGD
30Q5 = 0.63 cfs = 0.41 MGD	High flow months: January through May.

This analysis assumes there are no significant discharges, withdrawals or springs influencing the flow in the Storey Creek upstream of the discharge point.



PLANT SCHEMATIC

DRAWN	SCALE	DATE	DOCUMENT NO.
KEL	NTS	23 JUL 01	16145-A-6

FIGURE 2

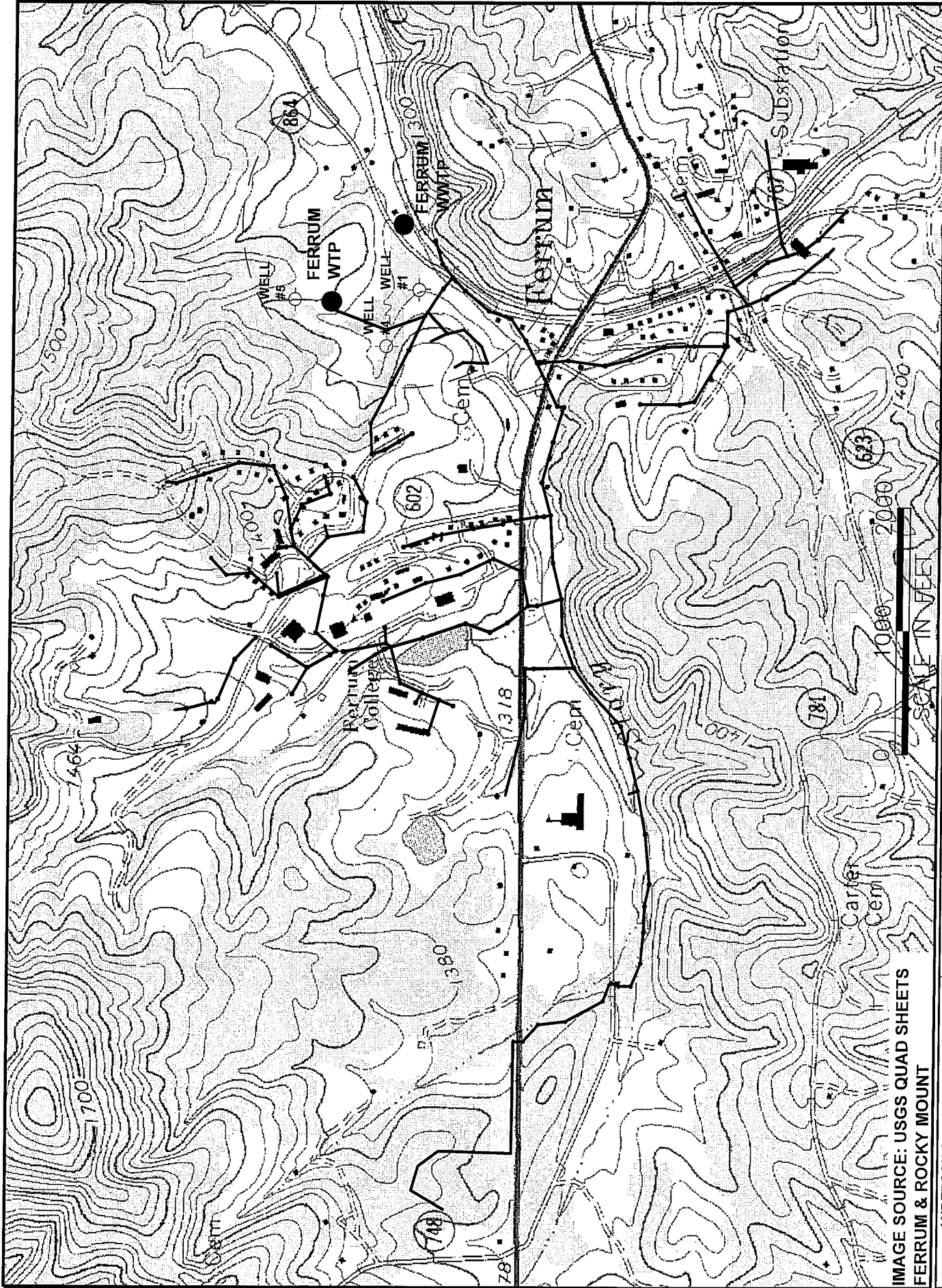



IMAGE SOURCE: USGS QUAD SHEETS
FERRUM & ROCKY MOUNT

	ANDERSON & ASSOCIATES, INC. Professional Design Services 100 Adams St., Suite 200 VA - NC - TN - WV www.aandassoc.com	DATE : 28 JUL 08 DRAWN : SEC CHECKED : SEC QA / DC :	REVISIONS:
DOCUMENT NO. 23678	FERRUM WATER & SEWER AUTHORITY FERRUM, VIRGINIA	WWTP LOCATION	SHEET 1 OF 1



VPDES PERMITS

Threatened and Endangered Species Coordination

To:

- ☒ DGIF, Environmental Review Coordinator
- ☒ DCR
- ☒ USFWS, T/E Review Coordinator

From: Susan K. Edwards *Susan K. Edwards*
 Environmental Engineer Sr.
 Water Permit Writer, DEQ-WCRO
 3019 Peters Creek Rd, Roanoke, VA 24019
skedwards@deq.virginia.gov
 540-562-6764

Date Sent: August 15, 2008

Permit Number: VA0029254

Facility Name:

Ferrum STP

Contact:

James "J.J." G. Keith II

Phone:

540-365-2193

Address:

330 Old Ferrum Rd, Ferrum VA 24088
 PO Box 40, Ferrum VA 24088

Location: South side of Route 684, approx. 2 miles NE of intersection with Route 40

USGS Quadrangle: Ferrum (050A)

Latitude/Longitude: N 36°55'35", E 80°00'35"

Receiving Stream: Storey Creek

Receiving Stream Flow Statistics used for Permit:

7Q10: 0.25 MGD	1Q10: 0.23 MGD
30Q5: 0.41 MGD	30Q10: 0.34 MGD
Harmonic Mean Flow: 0.82 MGD	

Effluent Characteristics and Max Daily Flow:

Reissuance of a discharge permit of treated domestic wastewater generated by approx. 5000 residents of the Ferrum community plus students & faculty at Ferrum College. Design flow: 0.4 MGD. Influent screening, pair of sequencing batch reactors, post equalization, chlorine disinfection & dechlorination, aeration, aerobic sludge digester & sludge press. Mixing zone @ 7Q10 = 82 ft

Species Search Results (or attach database report and map):

No T&E Species indicated on Storey Creek, but multiple on Pigg River. Discharge is almost 10 miles upstream from Pigg River at river mile 9.78.

Attached: Draft permit effluent limits page from last reissuance. New limitations page will include E. coli and some limitations may be adjusted from those provided. Map from VDGIF Database Search & printout of query - note that the listed species are from Pigg River listing.

DGIF email: projectreview@dgif.virginia.gov
 USF&W fax: (804)693-9032

A. Limitations and Monitoring Requirements *DRAFT*

1. During the period beginning with the effective date of the permit and lasting until the permit's expiration date the permittee is authorized to discharge from outfall serial number 001.

Such discharges shall be limited and monitored by the permittee as specified below:

<u>EFFLUENT CHARACTERISTICS</u>			<u>DISCHARGE LIMITATIONS</u>		<u>MONITORING REQUIREMENTS</u>		
<u>Monthly Average</u>	<u>Weekly Average</u>		<u>Minimum</u>	<u>Maximum</u>	<u>Frequency</u>	<u>Type</u>	<u>Sample</u>
Flow, (MGD) ^a	NL		NA	NA	NL	Continuous	Totalizing, Indicating & Recording
pH (standard units)	NA		NA	6.0	9.0	1/day	Grab
BOD ₅ ^c	9.3 mg/l	14.2 kg/d	14.0 mg/l	21.3 kg/d	NA	3 days/week	8 HC
Total Suspended Solids ^c	30 mg/l	45.4 kg/d	45 mg/l	68.1 kg/d	NA	3 days/week	8 HC
Dissolved Oxygen	NA		NA	6.0 mg/l	NA	1/day	Grab
Total Residual Chlorine ^{b & c}	55 µg/l		68 µg/l	NA	NA	3/day at 4 hour intervals	Grab
Total Recoverable Copper ^c	12.4 µg/l		12.4 µg/l	NA	NA	1/month	Grab
Total Recoverable Nickel ^c	8.46 µg/l		8.46 µg/l	NA	NA	1/month	Grab
Total Recoverable Zinc ^c	53.8 µg/l		53.8 µg/l	NA	NA	1/month	Grab
Ammonia as N - Winter ^c (January - May)	10.7 mg/l		10.7 mg/l	NA	NA	1/month	8 HC
Ammonia as N - Summer ^c (June - December)	6.9 mg/l		6.9 mg/l	NA	NA	1/month	8 HC

NA = Not applicable

NL = No limitation, monitoring required

8 HC = 8 Hour Composite

- a. The design flow of this treatment facility is 0.40 MGD.
- b. See Part I.B. for Total Residual Chlorine monitoring requirements.
- c. See Part I.D.1. for Quantification Levels and Compliance Monitoring.
- d. See Part I.C.11. for additional monitoring requirements.
- e. There shall be no discharge of floating solids or visible foam in other than trace amounts.
- f. At least 85% removal for BOD₅ and TSS must be attained for this effluent.

DRAFT

Define Point of Interest Ferrum (ppl) Franklin

36,55,42.5 -80,00,16.4

is the Search Point

Submit

Cancel

Search Point

- ☒ Change to "clicked" map point
☐ Fixed at 36,55,42.5 - 80,00,16.4

Show Position Rings

☒ Yes ☐ No

1 mile and 1/4 mile at the Search Point

Show Search Area

☒ Yes ☐ No

2 miles

Search Point is at
map center

Base Map Choices

Topography

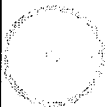
Map Overlay Choices

Current List: Position, Search

Map Overlay Legend



Position Rings
1 mile and 1/4
mile at the
Search Point



2 mile radius
Search Area



back

Map
Click

Pan

Map
Scale

In

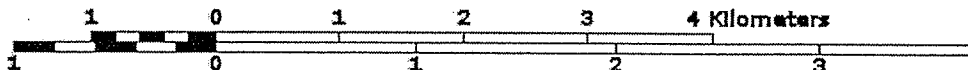
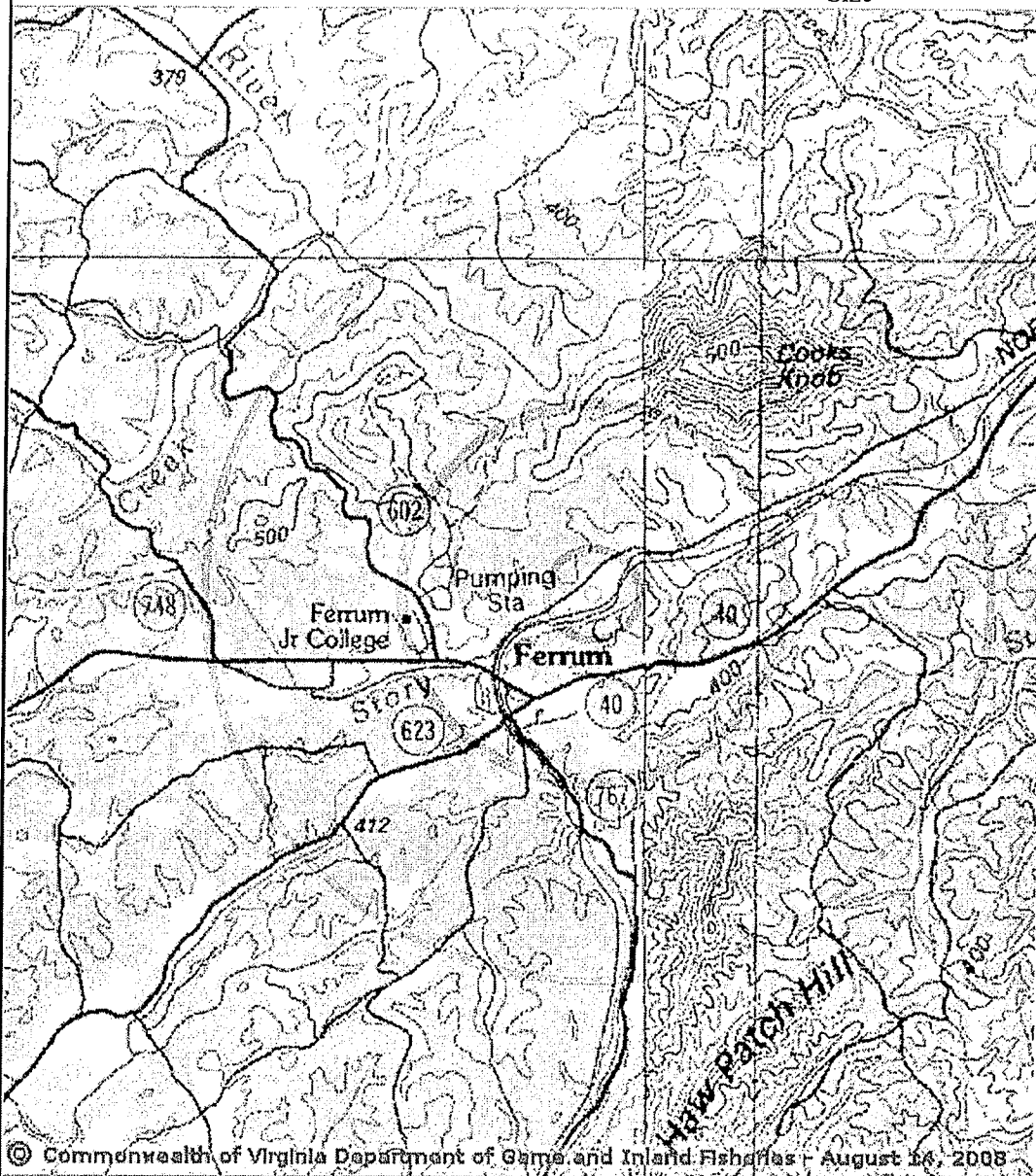
Zoom

Out

Screen
Size

Small

S



Point of Search 36,55,42.5 -80,00,16.4

Map Location 36,55,42.5 -80,00,16.4

Select Coordinate System: ☒ Degrees, Minutes, Seconds Latitude - Longitude

☐ Decimal Degrees Latitude - Longitude

☐ Meters UTM NAD83 East North Zone

☐ Meters UTM NAD27 East North Zone

Base Map source: USGS 1:100,000 topographic maps (see terraserver-usa.com for details)

Map projection is UTM Zone 17 NAD 1983 with left 583874 and top 4092217. Pixel size is 16 m. Coordinates displayed are Degrees, Minutes, Seconds North and West. Map is currently displaying columns by 600 rows for a total of 360000 pixels. The map display represents 9600 meters east to west by 9600 meters north to south for a total of 92.1 square kilometers. The map display represents 31500 meters east to west by 31500 meters north to south for a total of 35.5 square miles.

Black and white aerial photography acquired near 1990 and topographic maps are from the United States Department of the Interior, United States Geological Survey.

Shaded topographic maps are from TOPO! ©2006 National Geographic

<http://www.nationalgeographic.com/topo>

Color aerial photography acquired 2002 is from Virginia Base Mapping Program, Virginia Geographic Information Network

All other map products are from the Commonwealth of Virginia Department of Game and Inland Fisheries

map assembled 2008-08-14 11:47:28 (qa/qc May 21, 2008 10:49 - tm=196004 dist=3218 I

FRANKLIN COUNTY, VIRGINIA
Federally Listed, Proposed, and Candidate Species

<u>SCIENTIFIC NAME</u>	<u>COMMON NAME</u>	<u>STATUS</u>
<u>FISH</u>		
Percina rex	Roanoke logperch	LE
<u>INVERTEBRATES</u>		
Alasmidonta heterodon ¹	Dwarf wedgemussel	LE
Neonympha mitchelli mitchelli ¹	Mitchell's satyr	LE
Pleurobema collina ¹	James spinymussel	LE
<u>VASCULAR PLANTS</u>		
Echinacea laevigata	Smooth coneflower	LE
Isotria medeoloides ¹	Small whorled pogonia	LT

Species of Concern (No official Federal status)

<u>FISH</u>		
Noturus gilberti	Orangefin madtom	G2
<u>INVERTEBRATES</u>		
Acroneuria kosztarabi	Virginia stonefly	G1
Fusconaia masoni	Atlantic pigtoe	G2
<u>NON-VASCULAR PLANTS</u>		
Orthotrichum keeverae	Keever's bristle-moss	G2
<u>VASCULAR PLANTS</u>		
Pycnanthemum torrei	Torrey's mountain-mint	G2

¹This species has been documented in an adjacent county and may occur in this county.

August 8, 2005

Prepared by U.S. Fish and Wildlife Service, Virginia Field Office



Virginia Department of Game and Inland Fisheries

8/14/2008 10:28:31 AM

Fish and Wildlife Information Service

VaFWIS Initial Project Assessment Report

Compiled on

[Help](#)

8/14/2008, 10:28:31 AM

Known or likely to occur within a 2 mile radius of Ferrum (ppl)

Franklin

(at 36,55,22. -80,00,49.)

in 067 Franklin County, VA

393 Known or Likely Species ordered by Status Concern for Conservation
(displaying first 28) (28 species with Status* or Tier I**)

<u>BOVA Code</u>	<u>Status*</u>	<u>Tier**</u>	<u>Common Name</u>	<u>Scientific Name</u>	<u>Confirmed</u>	<u>Database(s)</u>
010214	FESE	I	<u>Logperch, Roanoke</u>	Percina rex		BOVA
040096	ST	I	<u>Falcon, peregrine</u>	Falco peregrinus		BOVA
040129	ST	I	<u>Sandpiper, upland</u>	Bartramia longicauda		BOVA
040293	ST	I	<u>Shrike, loggerhead</u>	Lanius ludovicianus		BOVA
010127	FSST	II	<u>Madtom, orange fin</u>	Noturus gilberti		BOVA
040093	FSST	II	<u>Eagle, bald</u>	Haliaeetus leucocephalus		BOVA
060173	FSST	II	<u>Pigtoe, Atlantic</u>	Fusconaia masoni		BOVA
040292	ST		<u>Shrike, migrant loggerhead</u>	Lanius ludovicianus migrans		BOVA
010110	FS	III	<u>Jumprock, bigeye</u>	Moxostoma ariommum	Yes	Collections,BOVA
010174	SS	II	<u>Bass, Roanoke</u>	Ambloplites cavifrons	Yes	Collections,BOVA
040266	SS	II	<u>Wren, winter</u>	Troglodytes troglodytes	Yes	CBC,BOVA
040094	SS	III	<u>Harrier, northern</u>	Circus cyaneus		BOVA
040036	SS	III	<u>Night-heron, yellow-crowned</u>	Nyctanassa violacea violacea		BOVA
040204	SS	III	<u>Owl, barn</u>	Tyto alba pratincola		BOVA
030012	CC	IV	<u>Rattlesnake, timber</u>	Crotalus horridus		BOVA
040264	SS	IV	<u>Creeper, brown</u>	Certhia americana	Yes	CBC,BOVA
040364	SS		<u>Dickcissel</u>	Spiza americana		BOVA
040032	SS		<u>Egret, great</u>	Ardea alba egretta		BOVA
040366	SS		<u>Finch, purple</u>	Carpodacus	Yes	CBC,BOVA

				purpureus		
040285	SS		<u>Kinglet, golden-crowned</u>	Regulus satrapa	<u>Yes</u>	CBC,BOVA
040112	SS		<u>Moorhen, common</u>	Gallinula chloropus cachinnans		BOVA
040262	SS		<u>Nuthatch, red-breasted</u>	Sitta canadensis	<u>Yes</u>	CBC,BOVA
040189	SS		<u>Tern, Caspian</u>	Sterna caspia		BOVA
040278	SS		<u>Thrush, hermit</u>	Catharus guttatus	<u>Yes</u>	CBC,BOVA
040314	SS		<u>Warbler, magnolia</u>	Dendroica magnolia		BOVA
050045	SS		<u>Otter, northern river</u>	Lontra canadensis lataxina		BOVA
040225		I	<u>Sapsucker, yellow-bellied</u>	Sphyrapicus varius	<u>Yes</u>	CBC,BOVA
040319		I	<u>Warbler, black-throated green</u>	Dendroica virens		BOVA

To view **All 393 species** [View 393](#)

* FE=Federal Endangered; FT=Federal Threatened; SE=State Endangered; ST=State Threatened; FP=Federal Proposed; FC=Federal Candidate; FS=Federal Species of Concern; SC=State Candidate; CC=Collection Concern; SS=State Special Concern

** I=VA Wildlife Action Plan - Tier I - Critical Conservation Need; II=VA Wildlife Action Plan - Tier II - Very High Conservation Need; III=VA Wildlife Action Plan - Tier III - High Conservation Need; IV=VA Wildlife Action Plan - Tier IV - Moderate Conservation Need

Anadromous Fish Use Streams

N/A

Colonial Water Bird Survey

N/A

Threatened and Endangered Waters (1 records)

[View Map of All Threatened and Endangered Waters](#)

Record ID	Stream Name	Designation ¹	T&E Waters Species			View Map
			Different Species	Highest TE [*]	Highest Tier ^{**}	
TE-127	<u>Pigg River</u>	F/S	2	FESE	I	<u>Yes</u>

¹ S = State Listed species present; F/S = Federal and State listed species present

Cold Water Stream Survey (Trout Streams)
Summary of Recent Observations

N/A

Public Holdings:

N/A

audit no. 195970 8/14/2008 10:28:31 AM Virginia Fish and Wildlife Information Service
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Bacteria Total Maximum Daily Load Development for Pigg River, Snow Creek, Story Creek, and Old Womans Creek

Submitted by:

Virginia Department of Environmental Quality
Virginia Department of Conservation and Recreation

Prepared by:

Department of Biological Systems Engineering, Virginia Tech



April 2006

VT-BSE Document No. 2006-0002

Chapter 2: Introduction

2.1. Background

2.1.1. TMDL Definition and Regulatory Information

Section 303(d) of the Federal Clean Water Act and the U.S. Environmental Protection Agency's (USEPA) Water Quality Planning and Management Regulations (40 CFR Part 130) require states to identify water bodies that violate state water quality standards and to develop Total Maximum Daily Loads (TMDLs) for such water bodies. A TMDL reflects the total pollutant loading a water body can receive and still meet water quality standards. A TMDL establishes the maximum allowable pollutant loading from both point and nonpoint sources for a water body, allocates the load among the pollutant contributors, and provides a framework for taking actions to restore water quality.

2.1.2. Impairment Listing

Old Womans Creek (VAW-L13R-01), Snow Creek (VAW-L17R-01), Story Creek (VAW-L14R-02), and three segments of Pigg River (VAW-L14R-01, VAW-L18R-01, VAW-L13L-02) are listed as impaired on Virginia's 2004 Section 303(d) Total Maximum Daily Load Priority List and Report (VADEQ, 2004) due to water quality violations of the bacteria standard. Of these, Story Creek (VAW-L17R-01), Upper Pigg River (VAW-L14R-01), Leesville Lake-Pigg River (VAW-L13L-02), and Lower Pigg River (VAW-L18R-01) have been on the list since at least 1998. The Virginia Department of Environmental Quality (VADEQ) has described the impaired segments as presented in Table 2.1. In addition to the impairments listed in Table 2.1 for which this TMDL was specifically developed, the drainage area for Pigg River includes the Lower Pigg River (VAW-L18R-01, 28.92 miles, from Big Chestnut Creek to the backwaters of Leesville Lake) and Big Chestnut Creek (VAW-L15R-01, 12.88 miles, from the confluence with Little Chestnut Creek to the mouth on the Pigg River). All impaired segments are shown in Figure 2.1. Although TMDL equations will not be specifically presented

for these two sections, the reductions presented in this document will affect these areas and thus a TMDL has implicitly been developed for those two stream segments.

As a point of clarification, 'Leesville Lake – Pigg River' was originally listed as part of VAW-L18R based on monitoring data from station 4APGG003.29. In the 2004 assessment, the segment was listed as part of VAW-L13L.

Table 2.1. Impaired Segments Addressed in this TMDL report.

Impaired Segment	Size	Target Date for TMDL Development	Description
Old Womans Creek	4.86 miles	2010	Headwaters (end of perennial section) to Old Womans Creek mouth on Roanoke River
Snow Creek	10.98 miles	2010	Snow Branch/Ditto Branch Confluence to Snow Creek mouth on Pigg River
Story Creek ¹	11.6 miles	2010	Intersection of Rt. 40 and Rt. 748 to Story Creek mouth on Pigg River
Upper Pigg River	35.06 miles	2006	South Prong Pigg River mouth on Pigg River to 10 miles downstream of the Rocky Mount STP
Leesville Lake-Pigg River	154 acres	2010	Backwaters of Leesville Lake on Pigg River to Pigg River confluence with Roanoke River

¹DEQ Fact Sheets list this stream as 'Storey Creek', but stakeholders corrected the spelling to 'Story Creek'

Table 3.4. VADEQ monitoring stations in Pigg River and Old Womans Creek.

Watershed Code	Station ID	Station Description	Stream Name	County
VAW-L13R	4AOWC002.35	Paisley Rd. (Rt. 756)	Old Womans Creek	Pittsylvania
VAW-L13R	4AOWC005.36	STA #17 Rt. 760 Bridge	Old Womans Creek	Pittsylvania
VAW-L14R	4ADOE002.47	Rt. 720 Bridge	Doe Run	Franklin
VAW-L14R	4APGG052.73	Rt. 713 Bridge Upstream of Rocky Mount STP	Pigg River	Franklin
VAW-L14R	4APGG068.49	Rt. 756 Bridge	Pigg River	Franklin
VAW-L14R	4APGG074.87	STA #18 Rt. 908 Ford	Pigg River	Franklin
VAW-L14R	4ASDA007.24	Rt. 40 Bridge Near Ferrum	Story Creek	Franklin
VAW-L14R	4ASDA009.77	Off Rt. 864, Below Ferrum STP Outfall	Story Creek	Franklin
VAW-L14R	4ASDA009.79	Rt. 623 Bridge Above Ferrum STP Outfall	Story Creek	Franklin
VAW-L14R	4ASDA000.67	Davis Mill Bridge	Story Creek	Franklin
VAW-L15R	4ACNT001.32	Rt. 715 Bridge	Big Chestnut Creek	Franklin
VAW-L16R	4APGG030.62	Rt. 646 Bridge	Pigg River	Franklin
VAW-L17R	4ASNW000.60	Kirby Ford Bridge	Snow Creek	Pittsylvania
VAW-L17R	4ASNW010.08	Rt. 651 Bridge	Snow Creek	Franklin
VAW-L18R	4AHPN001.62	Rt. 785 Bridge	Harpen Creek	Pittsylvania
VAW-L18R	4APGG003.29	Rt. 605 Bridge	Pigg River	Pittsylvania
VAW-L18R	4APGG008.42	Rt. 40 Bridge, Near Gaging Station	Pigg River	Pittsylvania
VAW-L18R	4APGG008.87	Off Rt. 40 at USGS Gage	Pigg River	Pittsylvania
VAW-L18R	4APGG016.06	Rt. 626 Bridge	Pigg River	Pittsylvania
VAW-L18R	4ATMA001.46	Rt. 644 Bridge	Tomahawk Creek	Pittsylvania

Table 6.10. Annual direct nonpoint source fecal coliform loads under existing and future conditions and corresponding reductions for TMDL allocation scenario 05 for Story Creek.

Source	Existing Conditions		Future Conditions		Allocation Scenario	
	Existing Conditions Load ($\times 10^{12}$ cfu/yr)	Percent of total direct deposited load from direct nonpoint source	Future Conditions Load ($\times 10^{12}$ cfu/yr)	Percent of total direct deposited load from direct nonpoint source	TMDL direct nonpoint source allocation load ($\times 10^{12}$ cfu/yr)	Percent Reduction from Future Load
Livestock in Streams	40	71%	40	14%	0	100%
Straight Pipes	4	7%	4	1%	0	100%
Wildlife in Streams	12	21%	12	4%	7	45%
Total	56		56		7	88%

6.4.3. Waste Load Allocation

A waste load allocation (WLA) was assigned to the one permitted point source facility in the Story Creek watershed (Table 6.11). The point source was represented in the allocation scenario by its current permit conditions; no reductions were required from the point source in the TMDL. Current permit requirements are expected to result in attainment of the *E. coli* WLA as required by the TMDL. Point source contributions to bacteria concentrations, even in terms of maximum flow, are minimal. In addition, the point source facility is required to discharge at or below the bacteria water quality criteria and therefore cannot cause a violation of those criteria without also violating the discharge permit. Because the permit for this facility already protects against violating the bacteria water quality standard, there is no need to modify the existing permit.

Table 6.11. Point source discharging into the Story Creek watershed.

Permit Number	Facility Name	Flow (gpd)	Permitted <i>E. coli</i> Conc. (cfu/100 mL)	Permitted <i>E. coli</i> Load (cfu/yr)	Allocated <i>E. coli</i> Load (cfu/yr)
VA0029254	Ferrum Town - STP	4×10^5	126	6.99×10^{11}	6.99×10^{11}

6.4.4. Summary of Story Creek's TMDL Allocation Scenario for Bacteria

A TMDL for *E. coli* has been developed for Story Creek. The TMDL addresses the following issues:

1. The TMDL meets both the calendar-month geometric mean and single sample water quality standards.
2. Because *E. coli* loading data were not available to quantify nonpoint source bacterial loads, available fecal coliform loading data were used as input to HSPF. HSPF was then used to simulate in-stream fecal coliform concentrations. The VADEQ fecal coliform to *E. coli* concentration translator equation was then used to convert the simulated fecal coliform concentrations to *E. coli* concentrations.
3. The TMDL was developed taking into account all fecal bacteria sources (anthropogenic and natural) from both point and nonpoint sources.
4. An implicit margin of safety (MOS) was incorporated by utilizing professional judgment and conservative estimates of model parameters.
5. Both high- and low-flow stream conditions were considered while developing the TMDL. In the Story Creek watershed, low stream flow was found to be the environmental condition most likely to cause a violation of the geometric mean criterion; high stream flow conditions after storm events were most likely to cause violations of the single sample criterion; because the TMDL was developed using a continuous simulation model, it applies to both high- and low-flow conditions.
6. Both the flow regime and bacteria loading to Story Creek are seasonal. The TMDL accounts for these seasonal effects.

The selected *E. coli* TMDL allocation that meets both *E. coli* criteria requires a 100% reduction in cattle direct deposits to the stream; 100% reduction

in straight pipe contributions; 45% reduction in wildlife direct deposits to the stream; 85% reduction from pasture areas; and 75% reduction from residential surfaces. Using equation 6.1, the summary of the bacteria TMDL for Story Creek for the selected allocation scenario (05) is given in Table 6.12.

Table 6.12. Annual *E. coli* loadings (cfu/yr) at the watershed outlet used for the Story Creek bacteria TMDL.

Parameter	SWLA	SLA	MOS	TMDL
<i>E. coli</i>	6.99×10^{11} (VA0029254 = 6.99×10^{11})	1.86×10^{13}	--	1.93×10^{13}
Implicit MOS				

6.5. Upper Pigg River Bacteria TMDL

6.5.1. Existing Conditions

Analysis of the simulation results for the existing conditions in the watershed (Table 6.13) shows that contributions from livestock direct deposit dominate the in-stream concentrations of *E. coli*. Contributions from wildlife direct deposit and pervious land surfaces also contribute significant amounts to the average daily *E. coli* concentration. The results in this table were taken as the average daily contributions for the allocation simulation period, irrespective of the magnitude of the concentration or the flow rate (factors that were considered in the earlier section detailing the source breakdown used in the calibration). Table 6.13 gives an idea of what sources will be the dominant contributors to the instantaneous *E. coli* concentrations, and thus what sources will control the violations of the single sample standard.

The contribution of each of the sources listed in Table 6.13 to the calendar-month geometric mean *E. coli* concentration is shown in Figure 6.6. The 'PLS' category in Figure 6.6 includes both the 'nonpoint source loadings from pervious land segments' and the 'interflow and groundwater contribution' categories from Table 6.13. Because contributions from impervious surfaces only occur during rainfall events, there are many days with zero concentration from impervious areas; therefore, the calendar month geometric mean of impervious contributions is zero and does not appear in Figure 6.6.



2006 Impaired Waters

Categories 4 and 5 by City / County

Roanoke and Yadkin River Basins

Fact Sheet prepared for: Franklin Co.*

Cause Group ID: **L14R-02-BAC** **Storey Creek**

2006 TMDL Group Codes: 00298

Location: The Storey Creek upper limit is west of Ferrum near the intersection of Rt. 40 and Rt. 748, perennial headwaters (Ferrum Quad). The downstream limit is the mouth of Storey Creek on the Pigg River (Rocky Mount Quad).

City / County: Franklin Co

Use(s): Recreation

Cause(s) /

VA Category: Escherichia coli / 5A Fecal Coliform / 5A

The Pigg River Bacteria TMDL Study anticipates completion in spring 2006. The Study encompasses the Pigg River drainage, Doe Run, Old Womans Creek, Snow Creek, Storey Creek and Leesville Lake. However allocation scenario development is for the entire drainage to provide pollutant reductions for all watersheds contributing to the bacteria impairment. The 1996 Storey Creek bacteria 303(d) listing is a part of this TMDL Study. Additional stations are added along Storey Creek in support of the Pigg River Bacteria TMDL Study.

Four stations on Storey Creek find the recreational use impaired due to exceedence of the fecal coliform 400 cfu/100 ml instantaneous criterion and the escherichia coli instantaneous criterion of 235 cfu/100 ml. Escherichia coli (E.coli) will replace fecal coliform bacteria as the indicator with sufficient E.coli data as per Water Quality Standards [9 VAC 25-260-170. Bacteria; other waters].

4ASDA009.79- (Rt. 623 above Ferrum STP) FC exceeds the criterion in 11 of 27 samples. Exceeding values range from 490 cfu/100 ml to greater than 8000. E.coli exceeds the criterion in three of nine samples ranging from 250 to greater than 2000 cfu/100 ml.

4ASDA009.77- (off Rt. 864 below Ferrum STP) No additional data beyond the 2004 IR. FC exceeds the criterion in 13 of 37 samples. Exceeding values range from 500 cfu/100 ml to greater than 8000.

4ASDA007.24- (Rt. 40 Bridge) Two of 14 FC samples exceed the instantaneous criterion at 550 and 4700 cfu/100 ml. Station added in support of the Bacteria TMDL Study.

4ASDA000.67- (Davis Mill Bridge - Rt. 754) Four of six E.coli samples exceed the instantaneous criterion ranging from 310 to 1000 cfu/100 ml. Station added in support of the Bacteria TMDL Study.

Assessment Unit / Water Name / Description	Cause Category / Name	Cycle First Listed	TMDL Schedule	Size
VAW-L14R_SDA01A00 / Storey Creek Lower / Storey Creek mainstem from the Ferrum Water and Sewerage Authority POTW downstream to the Storey Creek mouth on the Pigg River.	5A Escherichia coli	2006	2010	9.61
VAW-L14R_SDA02A00 / Storey Creek Upper / Storey Creek mainstem perennial headwaters downstream to the Ferrum Water and Sewerage Authority POTW.	5A Escherichia coli	2006	2010	1.99

Storey Creek

Estuary (Sq. Miles) Reservoir (Acres) River (Miles)

Escherichia coli - Total Impaired Size by Water Type:

11.60



2006 Impaired Waters

Categories 4 and 5 by City / County

Roanoke and Yadkin River Basins

Fact Sheet prepared for: Franklin Co.*

Sources:

Livestock (Grazing or
Feeding Operations)

Municipal (Urbanized High
Density Area)

On-site Treatment Systems
(Septic Systems and Similar
Decentralized Systems)

Unspecified Domestic Waste

Wastes from Pets

Wildlife Other than
Waterfowl

*The narrative above describes the entire extent of the Impairment. Sizes presented may not represent the total overall size of the impairment. Impaired waters may cross or share jurisdictional boundaries and as a result are not strictly limited to a specific jurisdictional boundary.

MEMORANDUM
VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY
WEST CENTRAL REGIONAL OFFICE
WATER DIVISION

3019 Peters Creek Road

Roanoke, Virginia 24019-2738

SUBJECT: Site visit for VPDES Permit Reissuance - VA0029254
Ferrum STP, Franklin County

To: VPDES Permit file VA0029254

From: Susan K. Edwards, Environmental Engineer Sr.

Date: October 6, 2008



On Friday, October 3, 2008, the writer performed a site visit at the Ferrum STP. Present during the visit was J.J. Keith who is the plant administrator and principal operator for the Ferrum STP. The treatment plant is a sequencing batch reactor (SBR) plant installed during the 1999-2004 permit term. The system is a 400,000 gallon-per-day biological treatment system. The treatment facility consists of a mechanical or bar screen and grinder with settling for primary treatment and a pump station. Treatment includes the ability to adjust pH prior to treatment by twin 7-phase Aqua-Aerobic System Inc. sequencing batch reactor basins, a post equalization basin, capability to pump to three Parkson DynaSand sand filters, disinfection with two chlorine contact tanks, dechlorination, post aeration, flow monitoring and sampling station, and an outfall structure. The treatment works also includes two aerobic sludge digesters tanks, belt sludge press using polymer addition and sludge storage capability. The treatment plant has the now unused flow equalization tank available for use if needed. The Ferrum STP serves the community of Ferrum that includes the variable population of students, faculty and staff of Ferrum College. The population served is approximately 5000 people. Flow is greatly impacted by the college population change with roughly 8-months in session and 4-month of mostly local resident contribution to the plant flow.

There aren't any operations problems with the treatment system. The treatment process was reviewed beginning at the headworks through to the discharge. There were no chemicals observed stored outside of buildings. Chemicals used for disinfection and dechlorination and the polymer used for sludge thickening are all stored inside. There is some filter sand stored outside but this inert material does not present a risk to water quality. The Operations and Maintenance manual for the facility is maintained at the plant and has been review and approved.

To improve current metals removal they have been raising the pH at the treatment plant by adding soda ash. There are a few changes at the plant since the last reissuance. Firstly, the chlorine has changed from gas to liquid form. Sulfur dioxide used for dechlorination is still gas. In addition, the treatment plant is now accepting the decanted liquid from a local septage hauler. The hauler transports non-decant septage waste to Henry County PSA.

They are investigating ways to improve removal of metals using polymers and the existing sand filters after biological treatment. The trial would involve raising the pH to around 11, the use of polymers and the sand filters to remove more solids including the metals and then reducing the pH at the chlorine contact tank. A plan will be submitted to the regional office for review prior to beginning tests.

Effluent flow is measured and samples are taken by an auto-sampler after the post treatment aeration basin prior to discharge from the site. The discharge is through pipe to a concrete pad on a very short side channel to Storey Creek. The "receiving stream" is a well-defined channel and there is substantial flow evident without the contribution of the discharge. There was no build-up of biological sludge, no erosion or other conditions observed downstream of the discharge that are of concern.

The facility appeared in good condition and there were no areas in need attention observed during the site visit for permit reissuance.

DMR Data Summary
Ferrum STP

VA0029254

Due Date	Flow (MGD)		pH (s.u.)		BOD5		TSS		DO Conc.	Ammonia	
	Qty	Avg	Min	Max	Qty	Max	Qty	Max		Conc Summer	Conc Winter
10-Sep-2005	0.108	0.173	6.71	7.52	<QL	<QL	1.06	2.05	6.12	<QL	<QL
10-Oct-2005	0.113	0.153	6.82	7.43	1.39	2.56	1.09	1.31	6.1	5.4	5.4
10-Nov-2005	0.134	0.376	6.75	7.31	2.14	5.07	2.13	4.15	6.6	<QL	<QL
10-Dec-2005	0.133	0.499	6.48	7.26	<QL	<QL	1.84	2.47	6.82	<QL	<QL
10-Jan-2006	0.131	0.247	6.44	7.37	<QL	<QL	0.92	1.6	6.9	1.3	1.3
10-Feb-2006	0.141	0.288	6.35	7.2	3.36	6.8	2.76	3.96	8.6		6
10-Mar-2006	0.127	0.165	6.77	7.31	6.71	6.89	4.58	9.12	6.9	18.4	18.4
10-Apr-2006	0.097	0.136	6.06	7.26	4.27	4.03	2.9	2.58	7.3	<QL	<QL
10-May-2006	0.102	0.159	6.44	7.36	1.48	2.55	1.6	2.11	7.04	<QL	<QL
10-Jun-2006	0.085	0.13	6.3	7.3	0.48	0.51	0.65	0.93	6.44		<QL
10-Jul-2006	0.118	0.519	6.36	7.21	2.73	0.85	1.14	0.69	6.0	0.6	0.6
10-Aug-2006	0.091	0.152	6.3	7.22	0.36	1.0	0.59	1.74	6.15	<QL	<QL
10-Sep-2006	0.093	0.211	6.47	7.2	0.62	0.56	0.6	0.46	6.04	0.2	0.2
10-Oct-2006	0.143	0.300	6.44	7.2	2.75	7.93	2.24	6.65	6.02	7.9	7.9
10-Nov-2006	0.131	0.295	6.56	7.03	<QL	<QL	<QL	<QL	6.05	<QL	<QL
10-Dec-2006	0.148	0.501	6.4	8.53	<QL	3.65	1.28	5.64	7.03	0.2	0.2
10-Jan-2007	0.115	0.212	6.28	7.18	<QL	<QL	<QL	<QL	8.0	0.6	0.6
10-Feb-2007	0.140	0.341	6.29	7.13	<QL	<QL	<QL	<QL			
10-Mar-2007	0.146	0.272	6.16	7.06	4.46	10.49	4.55	10.26	8.88		0.7
10-Apr-2007	0.155	0.443	6.36	7.37	0.37	0.95	1.3	1.22	8.88	11.5	11.5
10-May-2007	0.131	0.201	6.93	7.52	1.38	2.32	1.33	1.52	6.1	9.6	9.6
10-Jun-2007	0.086	0.118	6.66	7.33	<QL	<QL	<QL	<QL	6.02	14.1	14.1
10-Jul-2007	0.087	0.168	6.72	7.67	<QL	<QL	0.42	0.49	6.13	<QL	<QL
10-Aug-2007	0.079	0.109	6.69	7.54	<QL	<QL	<QL	<QL	6.12	<QL	<QL
10-Sep-2007	0.086	0.168	6.9	7.44	<QL	<QL	<QL	<QL	6.02	3.6	3.6
10-Oct-2007	0.127	0.346	6.7	7.49	1.2	3.04	1.18	2.44	6.02	<QL	<QL
10-Nov-2007	0.118	0.265	6.71	7.5	<QL	<QL	<QL	<QL	6.0	<QL	<QL
10-Dec-2007	0.116	0.157	6.79	7.66	<QL	<QL	<QL	<QL	6.79	<QL	<QL
10-Jan-2008	0.106	0.170	6.75	7.66	<QL	<QL	<QL	<QL	6.3	<QL	<QL
10-Feb-2008	0.111	0.183	6.87	7.85	<QL	<QL	<QL	<QL	6.1	<QL	<QL
10-Mar-2008	0.139	0.286	6.69	7.34	<QL	<QL	0.64	1.2	7.0		<QL
10-Apr-2008	0.116	0.242	6.53	7.55	<QL	<QL	1.54	1.81	6.55	6.1	6.1
10-May-2008	0.143	0.268	6.53	7.17	<QL	3.92	1.4	2.77	6.0	13.4	13.4
10-Jun-2008	0.088	0.149	6.44	7.23	<QL	2.88	1.78	1.93	6.07	2.8	2.8
10-Jul-2008	0.074	0.146	6.47	7.38	<QL	<QL	0.43	0.59	6.02	<QL	<QL
10-Aug-2008	0.067	0.147	6.37	7.72	<QL	<QL	<QL	<QL	6.02	<QL	<QL
Permit limits	NL(0.4)	NL	6.0	9.0	14.2	21.3	45.4	68.1	6.0	6.9	10.7
								30			
								45			

DMR Date
 Ferrum STP
 Total Recoverable Metal Data

VA0029254

Copper		Nickel		Zinc
<u>DMR date</u>	<u>Conc.</u>	<u>DMR date</u>	<u>Conc.</u>	<u>Conc.</u>
10-Sep-2005	<QL	10-Feb-2008	9	77
10-Oct-2005	<QL	10-Mar-2008	8	80
10-Nov-2005	<QL	10-Apr-2008	X	X
10-Dec-2005	<QL	10-May-2008	7	71
10-Jan-2006	<QL	10-Jun-2008	6	47
10-Feb-2006	14	10-Jul-2008	6	71
10-Mar-2006	14	10-Aug-2008	9	55
10-Apr-2006	10			
10-May-2006	<QL	permit limit	8.46	53.8
10-Jun-2006	<QL			
10-Jul-2006	<QL			
10-Aug-2006	<QL			
10-Sep-2006	<QL			
10-Oct-2006	<QL			
10-Nov-2006	14			
10-Dec-2006	12			
10-Jan-2007	<QL			
10-Feb-2007	<QL			
10-Mar-2007	13			
10-Apr-2007	<QL			
10-May-2007	<QL			
10-Jun-2007	<QL			
10-Jul-2007	<QL			
10-Aug-2007	<QL			
10-Sep-2007	<QL			
10-Oct-2007	<QL			
10-Nov-2007	<QL			
10-Dec-2007	<QL			
10-Jan-2008	<QL			
10-Feb-2008	<QL			
10-Mar-2008	<QL			
10-Apr-2008	6			
10-May-2008	<QL			
10-Jun-2008	<QL			
10-Jul-2008	<QL			
10-Aug-2008	<QL			
permit limit	12.4			

DEPARTMENT OF ENVIRONMENTAL QUALITY
WATER QUALITY MONITORING
ATTACHMENT A

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NOV - 2

DEQ-WCRO

FACILITY NAME: Ferrum STP (Ferrum Water & Sewage Authority)
ADDRESS: P. O. Box 40, Ferrum, VA 24088
OUTFALL NO.: 001

DEQ PARAM #	EPA PARAM #	CHEMICAL	EPA ANALYSIS NO.	QUANTIFICATION LEVEL ⁽¹⁾	REPORTING RESULTS	SAMPLE TYPE ⁽²⁾	SAMPLE FREQUENCY ⁽³⁾	SPECIFIC TARGET VALUE ⁽⁴⁾
METALS								
		Antimony (Dis.)	(5)	(5)	<5.0 ug/L	G	1/5 YR	4.4
438	01000	Arsenic (Dis.)	(5)	(5)		G	X	NA
		Arsenic III (Dis.)	(5)	(5)	<5.0 ug/L	G	1/5 YR	47
439	01005	Barium (Dis.)	(5)	(5)		G	X	NA
440	01025	Cadmium (Dis.)	(5)	(5)	<0.5 ug/L	G	1/5 YR	0.3
232	01033	Chromium III*	(5)	(5)	<1.0 ug/L	G	1/5 YR	35
023	01032	Chromium VI	(5)	(5)	<10.0 ug/L	G	1/5 YR	2.6
442	01040	Copper (Dis.)	(5)	(5)		G	X	NA
308	01046	Iron (Dis.)	(5)	(5)		G	X	NA
405	01049	Lead (Dis.)	(5)	(5)	<5.0 ug/L	G	1/5 YR	1.9
443	01056	Manganese (Dis.)	(5)	(5)		G	X	NA
444	71890	Mercury (Dis.)	(5)	(5)	<0.2 ug/L	G	1/5 YR	1.0
445	01065	Nickel (Dis.)	(5)	(5)	12.0 ug/L	G	A	
446	01145	Selenium (Dis.)	(5)	(5)	<5.0 ug/L	G	1/5 YR	2.0
447	01075	Silver (Dis.)	(5)	(5)	<1.0 ug/L	G	1/5 YR	0.3
448	01092	Zinc (Dis.)	(5)	(5)	64 ug/L	G	A	
PESTICIDES/PCB'S								
332	39330	Aldrin	608	0.05	<0.05 ug/L	G or C	1/5 YR	NA
333	39350	Chlordane	608	0.2	<0.2 ug/L	G or C	1/5 YR	NA
334	77969	Chlorpyrifos (Dursban)	622	(7)	<0.002 mg/L	G or C	1/5 YR	NA
		DDD	608	0.1	<0.05 ug/L	G or C	1/5 YR	NA
		DDE	608	0.1	<0.05 ug/L	G or C	1/5 YR	NA
335	39370	DDT	608	0.1	<0.05 ug/L	G or C	1/5 YR	NA
336	39560	Demeton	(6)	(7)	<0.001 mg/L	G or C	1/5 YR	NA
523	39730	2,4- dichlorophenoxy acetic acid (2,4-D)	(6)	(7)		G or C	X	NA
337	39380	Dieldrin	608	0.1	<0.05 ug/L	G or C	1/5 YR	NA
		Endosulfan	608	0.1	<0.05 ug/L	G or C	1/5 YR	NA
339	39390	Endrin	608	0.1	<0.05 ug/L	G or C	1/5 YR	NA
340	39580	Guthion	622	(7)	<0.001 mg/L	G or C	1/5 YR	NA
341	39410	Heptachlor	608	0.05	<0.05 ug/L	G or C	1/5 YR	NA

DEPARTMENT OF ENVIRONMENTAL QUALITY
WATER QUALITY MONITORING
ATTACHMENT A

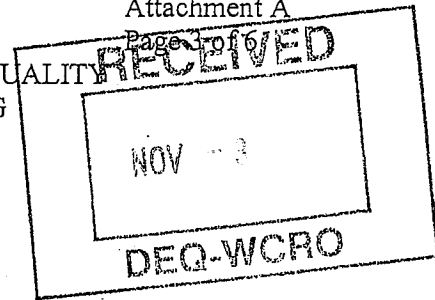
RECEIVED

NOV - 3

FACILITY NAME: Ferrum STP (Ferrum Water & Sewage Authority)
ADDRESS: P. O. Box 40, Ferrum, VA 24088
OUTFALL NO.: 001

DEQ PARAM #	EPA PARAM #	CHEMICAL	EPA ANALYSIS NO.	QUANTIFICATION LEVEL ⁽¹⁾	REPORTING RESULTS	SAMPLE TYPE ⁽²⁾	SAMPLE FREQUENCY ⁽³⁾	SPECIFIC TARGET VALUE ⁽⁴⁾
342	77835	Hexachlorocyclo hexane (Lindane)	608	0.05	<0.05 ug/L	G or C	1/5 YR	NA
		Kepone	(6)	(7)	<0.05 ug/L	G or C	1/5 YR	NA
343	39530	Malathion	(6)	(7)	<0.001 mg/L	G or C	1/5 YR	NA
344	39480	Methoxychlor	(6)	(7)	<0.05 ug/L	G or C	1/5 YR	NA
345	39755	Mirex	(6)	(7)	<0.05 ug/L	G or C	1/5 YR	NA
346	39540	Parathion	(6)	(7)	<0.001 mg/L	G or C	1/5 YR (FW)	NA
641		PCB-1242	608	1.0	<0.05 ug/L	G or C	1/5 YR	NA
642		PCB-1254	608	1.0	<0.02 ug/L	G or C	1/5 YR	NA
643		PCB-1221	608	1.0	<0.05 ug/L	G or C	1/5 YR	NA
644		PCB-1232	608	1.0	<0.05 ug/L	G or C	1/5 YR	NA
645		PCB-1248	608	1.0	<0.05 ug/L	G or C	1/5 YR	NA
618	39508	PCB-1260	608	1.0	<0.02 ug/L	G or C	1/5 YR	NA
646		PCB-1016	608	1.0	<0.05 ug/L	G or C	1/5 YR	NA
349	39400	Toxaphene	608	5.0	<0.05 ug/L	G or C	1/5 YR	NA
647		2-(2,4,5- Trichlorophenoxy) propionic acid (Silvex)	(6)	(7)		G or C	X	NA
BASE NEUTRAL EXTRACTABLES								
		Acenaphthene	625	10.0	<5.0 ug/L	G or C	1/5 YR	NA
275	34222	Anthracene	625	10.0	<5.0	G or C	1/5 YR	NA
276	34526	Benzo(a) anthracene	625	10.0	<5.0	G or C	1/5 YR	NA
648		Benzo(b) fluoranthene	625	10.0	<5.0	G or C	1/5 YR	NA
278	34242	Benzo(k) fluoranthene	625	10.0	<5.0	G or C	1/5 YR	NA
277	34247	Benzo(a)pyrene	625	10.0	<5.0	G or C	1/5 YR	NA
		Butylbenzyl phthalate	625	10.0	<5.0	G or C	1/5 YR	NA
282	34320	Chrysene	625	10.0	<5.0	G or C	1/5 YR	NA
654		Dibenz(a,h) anthracene	625	20.0	<5.0	G or C	1/5 YR	NA
		Dibutylphthalate	625	10.0	<5.0	G or C	1/5 YR	NA
259	34536	1,2- Dichlorobenzene	625 624	10.0	<5.0	G or C	1/5 YR	NA
264	34566	1,3- Dichlorobenzene	625 624	10.0	<5.0	G or C	1/5 YR	NA

DEPARTMENT OF ENVIRONMENTAL QUALITY
WATER QUALITY MONITORING
ATTACHMENT A



FACILITY NAME: Ferrum STP (Ferrum Water & Sewage Authority)
ADDRESS: P. O. Box 40, Ferrum, VA 24088
OUTFALL NO.: 001

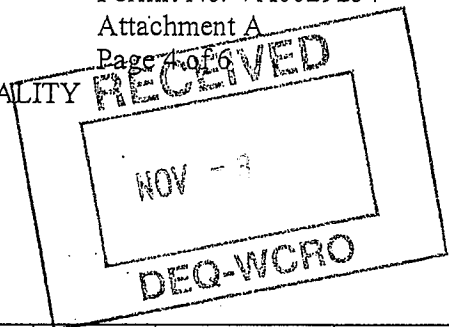
DEQ PARAM #	EPA PARAM #	CHEMICAL	EPA ANALYSIS NO.	QUANTIFICATION LEVEL ⁽¹⁾	REPORTING RESULTS	SAMPLE TYPE ⁽²⁾	SAMPLE FREQUENCY ⁽³⁾	SPECIFIC TARGET VALUE ⁽⁴⁾
266	34571	1,4-Dichlorobenzene	625	10.0	< 5.0 µg/L	G or C	1/5 YR	NA
		Diethyl phthalate	625	10.0		G or C	1/5 YR	NA
170		Di-2-Ethylhexyl Phthalate	625	10.0		G or C	1/5 YR	NA
239	34611	2,4-Dinitrotoluene	625	10.0		G or C	1/5 YR	NA
287	34376	Fluoranthene	625	10.0		G or C	1/5 YR	NA
288	34381	Fluorene	625	10.0		G or C	1/5 YR	NA
651		Indeno(1,2,3-cd) pyrene	625	20.0		G or C	1/5 YR	NA
650		Isophorone	625	10.0		G or C	1/5 YR	NA
293	34696	Naphthalene	625	10.0		G or C	1/5 YR	NA
		Nitrobenzene	625	10.0		G or C	1/5 YR	NA
296	34469	Pyrene	625	10.0		G or C	1/5 YR	NA
		1,2,4-Trichlorobenzene	625	10.0		G or C	1/5 YR	NA

VOLATILES

216	34030	Benzene	624	10.0	< 5.0 µg/L	G	1/5 YR	NA
484	32104	Bromoform	624	10.0		G	1/5 YR	NA
236	32102	Carbon Tetrachloride	624	10.0		G	1/5 YR	NA
652		Chlorodibromomethane	624	10.0		G	1/5 YR	NA
223	32106	Chloroform	624	10.0		G	1/5 YR	NA
649		Dichloromethane	624	20.0		G	1/5 YR	NA
244	79603	Dichlorobromomethane	624	20.0		G	1/5 YR	NA
260	34531	1,2-Dichloroethane	624	10.0		G	1/5 YR	NA
		1,1-Dichloroethylene	624	10.0		G	1/5 YR	NA
172	34371	Ethylbenzene	624	10.0		G	1/5 YR	NA
653		Monochlorobenzene	624	50.0		G	1/5 YR	NA
220	34475	Tetrachloroethylene	624	10.0		G	1/5 YR	NA
222	34010	Toluene	624	10.0		G	1/5 YR	NA
155	39180	Trichloroethylene	624	10.0		G	1/5 YR	NA
173	39175	Vinyl Chloride	624	10.0	< 0.10 mg/L	G	1/5 YR	NA

DEPARTMENT OF ENVIRONMENTAL QUALITY
WATER QUALITY MONITORING
ATTACHMENT A

FACILITY NAME: Ferrum STP (Ferrum Water & Sewage Authority)
ADDRESS: P. O. Box 40, Ferrum, VA 24088
OUTFALL NO.: 001



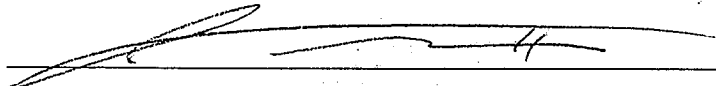
DEQ PARAM #	EPA PARAM #	CHEMICAL	EPA ANALYSIS NO.	QUANTIFICATION LEVEL ⁽¹⁾	REPORTING RESULTS	SAMPLE TYPE ⁽²⁾	SAMPLE FREQUENCY ⁽³⁾	SPECIFIC TARGET VALUE ⁽⁴⁾
ACIDS EXTRACTABLES								
		2-Chlorophenol	625	10.0	< 5.0 μ g/L	G or C	1/5 YR	NA
		2,4 dichlorophe- noxy acid (2,4-D)	625	10.0	↓	G or C	X	NA
		2,4 diimethylphenol	625	10.0	↓	G or C	1/5 YR	NA
210	39032	Pentachlorophenol	625	50.0 < 10.0 μ g/L	< 10 μ g/L	G or C	1/5 YR	NA
175	46000	Phenol ⁽⁸⁾	625	10.0	< 5.0 μ g/L	G or C	1/5 YR	NA
602	34621	2,4,6- Trichlorophenol	625	10.0	↓	G or C	1/5 YR	NA
MISCELLANEOUS								
039	00610	Ammonia as NH ₃ -N	350.1	200		C	A	NA
		Chlorides (mg/l)	(6)	(7)		C	X	NA
005	50060	Chlorine, Total Residual	(6)	100		G	A	NA
018	00720	Cyanide	335.2	10.0	< 5.0 μ g/L	G	1/5 YR	NA
306	03556	Dioxin	1613	0.00001		C	X	NA
		Fecal Coliform N/CML)	(6)	(7)		G	X	NA
		Foaming Agents (as MBAS)	(6)	(7)		G	X	NA
137	00900	Hardness (as mg/l CaCO ₃)	(6)	(7)	89.0	C	1/5 YR	NA
		Hydrogen Sulfide	(6)	(7)	< 10 μ g/L	G	1/5 YR	NA
		Nitrate (as mg/l N)	(6)	(7)	1.1 μ g/L	C	1/5 YR	NA
		Total Dissolved Solids (mg/l)	(6)	(7)	298	C	X	NA
009	00945	Sulfate (mg/l)	(6)	(7)		C	X	NA
350	30340	Tributyltin ⁽⁹⁾	NBSR 85-3295	(7)		C	X	NA
252	81551	Xylenes (total)	SW 846 Method 8021B	(7)	< 5.0 μ g/L	G	1/5 YR	NA

DEPARTMENT OF ENVIRONMENTAL QUALITY
WATER QUALITY MONITORING
ATTACHMENT A

FACILITY NAME: Ferrum STP (Ferrum Water & Sewage Authority)
ADDRESS: P. O. Box 40, Ferrum, VA 24088
OUTFALL NO.: 001

James G. Keith III Plant Administrator

Name of Principal Exec. Officer or Authorized Agent / Title



10-31-2008

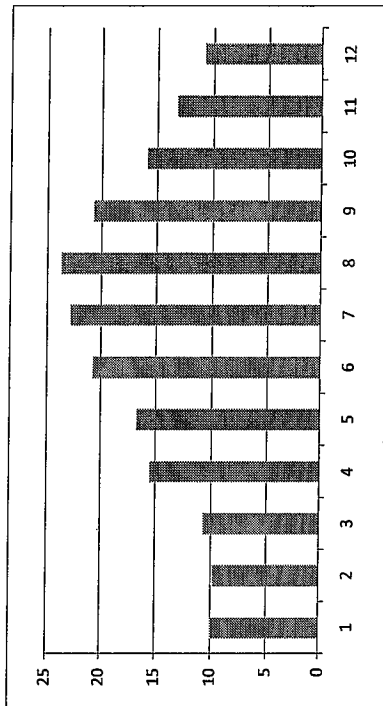
Signature of Principal Officer or Authorized Agent / Date

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, the information submitted is to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information including the possibility of fine and imprisonment for knowing violations. See 18 U.S.C. '1001 and 33 U.S.C. '1319. (Penalties under these statutes may include fines up to \$10,000 and or maximum imprisonment of between 6 months and 5 years.)

Ferrum Water and Sewage Authority
Effluent Temperature for Analysis of Nickel and Zinc Limitations

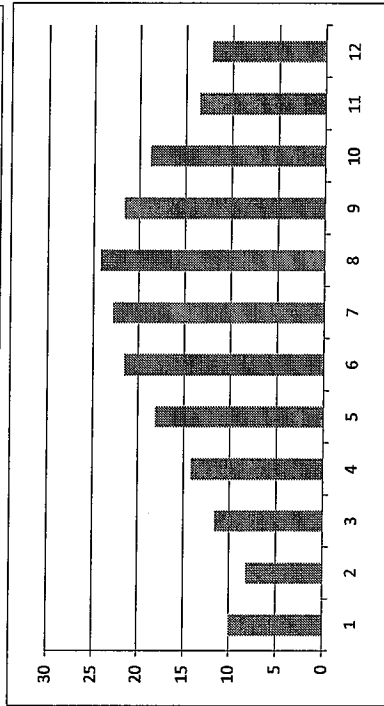
2006

	Minimum	Maximum	Average
Jan-06	8.6	12.6	10
Feb-06	7.7	12	9.8
Mar-06	8	14.4	10.7
Apr-06	12.5	18.2	15.5
May-06	14.6	20.8	16.7
Jun-06	18.4	23.8	20.7
Jul-06	20.8	24.3	22.8
Aug-06	21.8	25.2	23.7
Sep-06	17	22.5	20.7
Oct-06	11.3	20	15.9
Nov-06	10	16.7	13.3
Dec-06	8.6	15.6	10.8



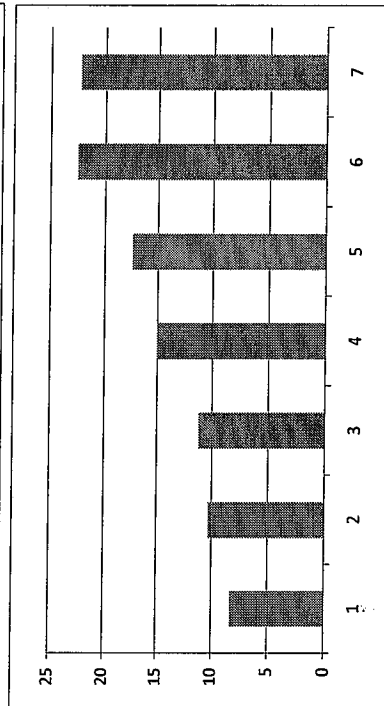
2007

	Minimum	Maximum	Average
Jan-07	7	13.5	10
Feb-07	5.4	11.7	8.2
Mar-07	7.1	15.7	11.6
Apr-07	10.5	17.6	14.2
May-07	14.8	20.9	18.1
Jun-07	19.5	23.5	21.5
Jul-07	21.2	24.5	22.8
Aug-07	22.5	26	24.2
Sep-07	18.4	24	21.6
Oct-07	15	22	18.8
Nov-07	11.7	19.7	13.5
Dec-07	8.5	15	12.2



2008

	Minimum	Maximum	Average
Jan-08	5.4	10.9	8.3
Feb-08	8	13.6	10.3
Mar-08	8.7	14	11.2
Apr-08	12.7	19	15
May-08	14.7	21	17.4
Jun-08	20.4	24.6	22.5
Jul-08	21.7	24.8	22.3



Ferrum STP**VA0029254****Effluent Hardness Data**

<u>Date</u>	<u>Hardness</u> <u>mg/L CaCO3</u>
Mar-99	104
Apr-99	91
May-99	102
Aug-00	68
Jan-01	82
Jan-02	82
May-02	82
Jan-03	88
Feb-08	172
Mar-08	114
Apr-08	102
Apr-08	93
May-08	110

96.76 < mean hardness

**Effluent Nickel & Zinc data
Dissolved data**

<u>date</u>	<u>Ni</u>	<u>Zn</u>
Aug-00	-	50
Jan-01	-	50
Jan-02	-	80
May-02	9	80
Jan-03	6	90
Jan-04	11	50
Mar-04	8	70
Nov-04	<5	31
Dec-04	<5	50
Jan-05	5	31
Mar-05	5	53
Jan-07	8	90

Water Shed Code
Station Description
Station ID

VAW-L14R
RT. 623 Bridge above Ferrum STP
4ASDA009.79

<u>Date</u>	<u>pH</u>	<u>DO</u>	<u>Temp C</u>	<u>Hardness</u>	
2/8/2000	8	12.03	7.7	43.4	
4/3/2000	7.86	8.7	17.9	33	
6/20/2000	7.93	7.65	24.1	46.3	
7/19/2000	7.88	8.3	22.4	49	
8/10/2000	7.66	7.2	25.9	43	
9/14/2000	7.66	7.8	20.4	36.4	
5/7/2001	8.51	8.92	15.8	33.6	
9/24/2001	7.8	7.7	18.7	39	
10/24/2001	7.7	8.7	14.4	43.8	
12/17/2001	8.2	9.2	9.8	42.3	
2/26/2002	8	11.5	7.5	33	Wet Season
4/4/2002	7.4	11.1	12	22.7	<u>Temp</u>
6/10/2002	8.37	8.2	19	42.4	7.7
8/20/2002	8.1	6.94	22.2	48.5	17.9
10/22/2002	7.62	9.55	13	53.4	15.8
12/19/2002	7	11.95	7.1	43.4	7.5
2/25/2003	7.6	11.1	6.7	23.6	12
4/23/2003	8.2	11.1	13	24.6	6.7
6/4/2003	8	8	17.2	35.3	13
90th percentile >	<u>8.23</u>		<u>22.7</u>		<u>16.64</u>
10th percentile >	<u>7.56</u>				
Mean hardness >			<u>37.7</u>		

**VPDES Permit VA0029254
Ferrum STP
Reissuance January 2009**

ATTACHMENT B

1. MIX.exe software output
2. Water Quality Management Plan Regulation 9 VAC25-720-80 Table B, Roanoke River Basin non-TMDL waste load allocations. Effective 12/28/05 regarding the BOD load for Ferrum STP
3. STANDARDS.exe output to set expected value for Dissolved Copper and Zinc data prior to the plant upgrade/expansion.
4. Pair of AWLA spreadsheet, 0.25 and 0.40 MGD flows, with new hardness & critical flow data to determine WLAs for copper, nickel and zinc. Also used to set SSTVs in Permit Attachment A.
5. STATS.exe software output for reanalysis of ammonia high-flow-tier & low-flow-tier limits, total residual chlorine limit, as well as copper, nickel and zinc limits.

Mixing Zone Predictions for Ferrum STP

Effluent Flow = 0.40 MGD
Stream 7Q10 = 0.252 MGD
Stream 30Q10 = 0.336 MGD
Stream 1Q10 = 0.229 MGD
Stream slope = 0.008 ft/ft
Stream width = 6 ft
Bottom scale = 3
Channel scale = 1

Mixing Zone Predictions @ 7Q10

Depth = .3184 ft
Length = 83.4 ft
Velocity = .5282 ft/sec
Residence Time = .0018 days

Recommendation:

A complete mix assumption is appropriate for this situation and the entire 7Q10 may be used.

Mixing Zone Predictions @ 30Q10

Depth = .341 ft
Length = 78.76 ft
Velocity = .5528 ft/sec
Residence Time = .0016 days

Recommendation:

A complete mix assumption is appropriate for this situation and the entire 30Q10 may be used.

Mixing Zone Predictions @ 1Q10

Depth = .3114 ft
Length = 85.09 ft
Velocity = .5211 ft/sec
Residence Time = .0454 hours

Recommendation:

A complete mix assumption is appropriate for this situation and the entire 1Q10 may be used.

9 VAC 25-720-80. Roanoke River Basin.

B. Roanoke River non - TMDL waste load allocations

Roanoke River non - TMDL waste load allocations								
Water Body	Permit No	Facility Name	Outfall No.	Receiving Stream	River Mile	Parameter Description	WLA	Units WLA
VAW-L04R	VA0072389	Oak Ridge Mobile Home Park	001	Falling Creek UT	0.32	BOD5	0.85	KG/D
VAW-L04R	VA0025020	Roanoke City Regional Water Pollution Control Plant	001	Roanoke River	201.81	BOD5	1173	KG/D
						TKN, APR-SEP	318	KG/D
						TKN, OCT-MAR	636	KG/D
			001	Roanoke River	201.81	BOD5	1173	KG/D
						TKN, APR-SEP	416	KG/D
						TKN, OCT-MAR	832	KG/D
			001	Roanoke River	201.81	BOD5	1173	KG/D
						TKN, APR-SEP	469	KG/D
						TKN, OCT-MAR	939	KG/D
VAW-L04R	VA0077895	Roanoke Moose Lodge	001	Mason Creek	7.79	BOD5, JUN-SEP	0.24	KG/D
						TKN, JUN-SEP	0.09	KG/D
VAW-L07R	VA0020842	Bedford County School Board-Stewartsville Elementary School	001	Nat Branch, UT	0.59	BOD5	0.5	KG/D
VAW-L14R	VA0029254	Ferrum Water and Sewage Authority - Ferrum Sewage Treatment Plant	001	Storey Creek	9.78	BOD5	14.2	KG/D
VAW-L14R	VA0085952	Rocky Mount Town Sewage Treatment Plant	001	Pigg River	52	BOD5	133	KG/D
VAW-L14R	VA0076015	Ronile Incorporated	001	Pigg River	57.24	BOD5	14.8	KG/D
VAW-L21R	VA0063738	Bedford County School Board - Staunton River High School	001	Shoulder Run, UT	0.95	BOD5	1.8	KG/D
VAW-L21R	VA0020869	Bedford County School Board - Thaxton Elementary School	001	Wolf Creek, UT	0.35	BOD5	0.31	KG/D
VAW-L22R	VA0023515	Blue Ridge Regional Jail Authority - Moneta Adult Detention Facility STP	001	Mattox Creek, UT	3.76	BOD5	1.66	KG/D
VAW-L25R	VA0020851	Bedford County School Board - Otter River Elementary School	001	Big Otter River, UT	1.15	BOD5	0.4	KG/D
VAW-L26R	VA0022390	Bedford City - Sewage Treatment Plant	001	Little Otter River	14.36	BOD5	52.8	KG/D
VAW-L26R	VA0020818	Bedford County School Board - Body Camp Elementary	001	Wells Creek, UT	2.22	BOD5	0.4	KG/D
VAW-L27R	VA0020826	Bedford County School Board - New London Academy	001	Buffalo Creek, UT	0.67	BOD5	0.39	KG/D
VAC-L29R	VA0031194	Briarwood Village Mobile Home Park STP	001	Smith Branch, UT	2.82	BOD5	1.3	KG/D
VAC-L35R	VA0023965	Campbell Co Util & Serv Auth - Rustburg	001	Mollys Creek	17.81	BOD5	8.13	KG/D
VAC-L39R	VA0084433	Drakes Branch WWTP	001	Twitty's Creek	6.04	BOD5	6.4	KG/D
VAC-L39R	VA0024058	Keysville WWTP	001	Ash Camp Creek	7.63	CBOD5, MAY-NOV	32.1	KG/D
						TKN, MAY-NOV	7.57	KG/D
VAC-L39R	VA0050822	Westpoint Stevens Inc Drakes Branch	001	Twittys Creek	7.22	BOD5	6.31	KG/D

Analysis of the Ferrum STP effluent data for Copper

The statistics for Copper are:

Number of values = 3

Quantification level = 10

Number < Quantification = 1

Expected value = 14.88357 ←

Variance = 79.74743

C.V. = .6

Statistics used = Reasonable potential assumptions - Type 1 data

The Standards for Copper are:

Acute Standard = 10

Chronic Standard = 6.9

Human health Standard = ----

The 97th percentile of daily values =	36.21794
The 97th percentile of 4 day averages =	24.76314
The 97th percentile of 30 day averages =	17.95038

The Acute standard is violated

The Chronic standard is violated

The Human health standard is not violated.

STANDARDS.exe run for Dissolved Zinc

To determine the expected instream value of dissolved zinc in the receiving stream prior to the plant expansion from 250,000 gallons-per-day to 400,000 gallons-per-day.

Data was taken from water quality standards monitoring prior to the expansion: 40, 30, 20 and 20 µg/L.

```
STANDARD.EXE
Analysis of the Storey Creek effluent data for ZincDissolved

The statistics for ZincDissolved are:
  Number of values      = 4
  Quantification level  = 10
  Number < Quantification = 0
  Expected value        = 27.5
  Variance              = 272.25
  C.V.                  = .6
  Statistics used       = Reasonable potential assumptions - Type 2 data

The Standards for ZincDissolved are:
  Acute Standard        = 85
  Chronic Standard      = 84
  Human Health Standard = 69000

The 97th percentile of daily values      = 66.91898
The 97th percentile of 4 day averages    = 45.75423
The 97th percentile of 30 day averages   = 33.16646

The Acute standard is not violated.
The Chronic standard is not violated.
The Human health standard is not violated.

Do you want to save the data to disk?
```

The program gives the statistically based expected value = 27.5 µg/L for dissolved zinc.

FRESHWATER WATER QUALITY CRITERIA / WASTELOAD ALLOCATION ANALYSIS

Facility Name: Ferrum STP

Permit No.: VA0029254

Receiving Stream: Storey Creek

Version: OWP Guidance Memo 00-2011 (8/24/00)

Stream Information			Stream Flows			Mixing Information			Effluent Information		
Mean Hardness (as CaCO ₃) =	37.7 mg/L		1Q10 (Annual) =	0.229 MGD		Annual - 1Q10 Mix =	100 %		Mean Hardness (as CaCO ₃) =	96.76 mg/L	
90% Temperature (Annual) =	22.7 deg C		7Q10 (Annual) =	0.254 MGD		- 7Q10 Mix =	100 %		90% Temp (Annual) =	22.8 deg C	
90% Temperature (Wet season) =	16.6 deg C		3Q10 (Annual) =	0.336 MGD		- 3Q10 Mix =	100 %		90% Temp (Wet season) =	17.12 deg C	
90% Maximum pH =	8.23 SU		1Q10 (Wet season) =	0.54 MGD		Wet Season - 1Q10 Mix =	100 %		90% Maximum pH =	7.67 SU	
10% Maximum pH =	7.56 SU		3Q10 (Wet season) =	0.715 MGD		- 3Q10 Mix =	100 %		10% Maximum pH =	7.18 SU	
Tier Designation (1 or 2) =	2		3Q05 =	0.41 MGD		- 3Q10 Mix =	100 %		Discharge Flow =	0.25 MGD	
Public Water Supply (PWS) Y/N? =	n		Harmonic Mean =	0.819 MGD							
Trout Present Y/N? =	n		Annual Average =	N/A MGD							
Early Life Stages Present Y/N? =	n										

Parameter (ug/l unless noted)	Background Conc.	Water Quality Criteria			Wasteload Allocations			Antidegradation Baseline			Antidegradation Allocations			Most Limiting Allocations		
		Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)
Acenaphthene	0	--	--	na	2.7E+03	--	--	na	2.7E+02	--	--	na	7.1E+02	--	--	na
Acrolein	0	--	--	na	7.8E+02	--	--	na	7.8E+01	--	--	na	2.1E+02	--	--	na
Acrylonitrile ^d	0	--	--	na	6.6E+00	--	--	na	6.6E-01	--	--	na	2.8E+00	--	--	na
Aldrin ^c	0	3.0E+00	--	na	1.4E-03	5.7E+00	--	na	1.4E-04	1.4E+00	--	na	6.0E-04	1.4E+00	--	na
Ammonia-N (mg/l)	0	1.10E+01	1.64E+00	na	--	2.1E+01	3.8E+00	na	--	5.3E+00	9.8E-01	na	--	5.3E+00	9.8E-01	na
(Yearly)																
Ammonia-N (mg/l)	0	8.95E+00	2.10E+00	na	--	2.8E+01	8.1E+00	na	--	7.1E+00	2.0E+00	na	--	7.1E+00	2.0E+00	na
(High Flow)																
Anthrachene	0	--	--	na	1.1E+05	--	--	na	1.1E+04	--	--	na	2.9E+04	--	--	na
Anilimony	0	--	--	na	4.3E+03	--	--	na	4.3E+02	--	--	na	1.1E+03	--	--	na
Arsenic	0.4	3.4E+02	1.5E+02	na	--	6.5E+02	3.0E+02	na	--	1.6E+02	7.6E+01	na	--	1.6E+02	7.6E+01	na
Barium	10	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na
Benzene ^c	0	--	--	na	7.1E+02	--	--	na	7.1E+01	--	--	na	3.0E+02	--	--	na
Benzidine ^d	0	--	--	na	5.4E-03	--	--	na	5.4E-04	--	--	na	2.3E-03	--	--	na
Benzo (a) anthracene ^c	0	--	--	na	4.9E-01	--	--	na	4.9E-02	--	--	na	2.1E-01	--	--	na
Benzo (b) fluoranthene ^c	0	--	--	na	4.9E-01	--	--	na	4.9E-02	--	--	na	2.1E-01	--	--	na
Benzo (k) fluoranthene ^c	0	--	--	na	4.9E-01	--	--	na	4.9E-02	--	--	na	2.1E-01	--	--	na
Benzo (a) pyrene ^c	0	--	--	na	4.9E-01	--	--	na	4.9E-02	--	--	na	2.1E-01	--	--	na
Bis(2-Chloroethyl) Ether	0	--	--	na	1.4E+01	--	--	na	1.4E+00	--	--	na	3.7E+00	--	--	na
Bis(2-Chloroisopropyl) Ether	0	--	--	na	1.7E+05	--	--	na	1.7E+04	--	--	na	4.5E+04	--	--	na
Bromofom ^c	0	--	--	na	3.6E+03	--	--	na	3.6E+02	--	--	na	1.5E+03	--	--	na
Butylbenzylphthalate	0	--	--	na	5.2E+03	--	--	na	5.2E+02	--	--	na	1.4E+03	--	--	na
Cadmium	0.2	2.6E+00	8.3E-01	na	--	4.7E+00	1.5E+00	na	--	1.3E+00	5.2E-01	na	--	1.3E+00	5.2E-01	na
Carbon Tetrachloride ^c	0	--	--	na	4.4E+01	--	--	na	4.4E+00	--	--	na	1.9E+01	--	--	na
Chlordane ^c	0	2.4E+00	4.3E-03	na	2.2E-02	4.6E+00	8.7E-03	na	2.2E-03	1.1E+00	2.2E-03	na	9.4E-03	1.1E+00	2.2E-03	na
Chloride	0	8.6E+05	2.3E+05	na	--	1.6E+06	4.6E+05	na	--	4.1E+05	1.2E+05	na	--	4.1E+05	1.2E+05	na
TRC	0	1.9E+01	1.1E+01	na	--	3.6E+01	2.2E+01	na	--	9.1E+00	5.5E+00	na	--	9.1E+00	5.5E+00	na
Chlorobenzene	0	--	--	na	2.1E+04	--	--	na	2.1E+03	--	--	na	5.5E+03	--	--	na

Parameter (ug/l unless noted)	Background Conc.	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				Most Limiting Allocations			
		Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH
Chlorodibromomethane ^g	0	--	--	na	3.4E+02	--	--	na	1.5E+03	--	--	na	3.4E+01	--	--	na	1.5E+02	--	--	na	1.5E+02
Chloroform ^c	0	--	--	na	2.9E+04	--	--	na	1.2E+05	--	--	na	2.9E+03	--	--	na	1.2E+04	--	--	na	1.2E+04
2-Chloronaphthalene	0	--	--	na	4.3E+03	--	--	na	1.1E+04	--	--	na	4.3E+02	--	--	na	1.1E+03	--	--	na	1.1E+03
2-Chlorophenol	0	--	--	na	4.0E+02	--	--	na	1.1E+03	--	--	na	4.0E+01	--	--	na	1.1E+02	--	--	na	1.1E+02
Chlorpyrifos	0	8.3E-02	4.1E-02	na	--	1.6E-01	8.3E-02	na	--	2.1E-02	1.0E-02	na	--	2.1E-02	1.0E-02	na	--	4.0E-02	2.1E-02	na	--
Chromium III	0	4.2E+02	5.3E+01	na	--	8.0E+02	1.1E+02	na	--	1.0E+02	1.3E+01	na	--	1.0E+02	1.3E+01	na	--	2.0E+02	2.7E+01	na	--
Chromium VI	0	1.6E+01	1.1E+01	na	--	3.1E+01	2.2E+01	na	--	4.0E+00	2.8E+00	na	--	4.0E+00	2.8E+00	na	--	7.7E+00	5.5E+00	na	--
Chromium, Total	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--
Chrysene ^c	0	--	--	na	4.9E-01	--	--	na	2.1E+00	--	--	na	4.9E-02	--	--	na	2.1E-01	--	--	na	2.1E-01
Copper	0.7	9.4E+00	6.4E+00	na	--	1.7E+01	1.2E+01	na	--	2.9E+00	2.1E+00	na	--	2.9E+00	2.1E+00	na	--	4.9E+00	3.6E+00	na	--
Cyanide	0	2.2E+01	5.2E+00	na	2.2E+05	4.2E+01	1.0E+01	na	5.7E+05	5.5E+00	1.3E+00	na	2.2E+04	1.1E+01	2.6E+00	na	5.7E+04	1.1E+01	2.6E+00	na	5.7E+04
DDD ^c	0	--	--	na	8.4E-03	--	--	na	3.8E-02	--	--	na	8.4E-04	--	--	na	3.8E-03	--	--	na	3.8E-03
DDE ^c	0	--	--	na	5.9E-03	--	--	na	2.5E-02	--	--	na	5.9E-04	--	--	na	2.5E-03	--	--	na	2.5E-03
DDT ^c	0	1.1E+00	1.0E-03	na	5.9E-03	2.1E+00	2.0E-03	na	2.5E-02	2.8E-01	2.5E-04	na	5.9E-04	5.3E-01	5.0E-04	na	2.5E-03	5.3E-01	5.0E-04	na	2.5E-03
Demeton	0	--	1.0E-01	na	--	--	2.0E-01	na	--	--	2.5E-02	na	--	--	2.5E-02	na	--	--	5.0E-02	na	--
Dibenz(a,h)anthracene ^c	0	--	--	na	4.9E-01	--	--	na	2.1E+00	--	--	na	4.9E-02	--	--	na	2.1E-01	--	--	na	2.1E-01
Dibutyl phthalate	0	--	--	na	1.2E+04	--	--	na	3.2E+04	--	--	na	1.2E+03	--	--	na	3.2E+03	--	--	na	3.2E+03
Dichloromethane	0	--	--	na	1.6E+04	--	--	na	6.8E+04	--	--	na	1.6E+03	--	--	na	6.8E+03	--	--	na	6.8E+03
(Methylene Chloride) ^c	0	--	--	na	1.7E+04	--	--	na	4.5E+04	--	--	na	1.7E+03	--	--	na	4.5E+03	--	--	na	4.5E+03
1,2-Dichlorobenzene	0	--	--	na	2.6E+03	--	--	na	6.9E+03	--	--	na	2.6E+02	--	--	na	6.9E+02	--	--	na	6.9E+02
1,3-Dichlorobenzene	0	--	--	na	2.6E+03	--	--	na	6.9E+03	--	--	na	2.6E+02	--	--	na	6.9E+02	--	--	na	6.9E+02
1,4-Dichlorobenzene	0	--	--	na	2.6E+03	--	--	na	6.9E+03	--	--	na	2.6E+02	--	--	na	6.9E+02	--	--	na	6.9E+02
3,3-Dichlorobenzidine ^g	0	--	--	na	7.7E-01	--	--	na	3.3E+00	--	--	na	7.7E-02	--	--	na	3.3E-01	--	--	na	3.3E-01
Dichlorobromomethane ^c	0	--	--	na	4.6E+02	--	--	na	2.0E+03	--	--	na	4.6E+01	--	--	na	2.0E+02	--	--	na	2.0E+02
1,2-Dichloroethane ^c	0	--	--	na	9.9E+02	--	--	na	4.2E+03	--	--	na	9.9E+01	--	--	na	4.2E+02	--	--	na	4.2E+02
1,1-Dichloroethylene	0	--	--	na	1.7E+04	--	--	na	4.5E+04	--	--	na	1.7E+03	--	--	na	4.5E+03	--	--	na	4.5E+03
1,2-Trans-dichloroethylene	0	--	--	na	1.4E+05	--	--	na	3.7E+05	--	--	na	1.4E+04	--	--	na	3.7E+04	--	--	na	3.7E+04
2,4-Dichlorophenol	0	--	--	na	7.9E+02	--	--	na	2.1E+03	--	--	na	7.9E+01	--	--	na	2.1E+02	--	--	na	2.1E+02
2,4-Dichlorophenoxy acetic acid (2,4-D)	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--
1,2-Dichloropropane ^g	0	--	--	na	3.9E+02	--	--	na	1.7E+03	--	--	na	3.9E+01	--	--	na	1.7E+02	--	--	na	1.7E+02
1,3-Dichloropropene	0	--	--	na	1.7E+03	--	--	na	4.5E+03	--	--	na	1.7E+02	--	--	na	4.5E+02	--	--	na	4.5E+02
Dieldrin ^c	0	2.4E-01	5.8E-02	na	1.4E-03	4.8E-01	1.1E-01	na	6.0E-03	6.0E-02	1.4E-02	na	1.4E-04	1.1E-01	2.8E-02	na	6.0E-04	1.1E-01	2.8E-02	na	6.0E-04
Diethyl Phthalate	0	--	--	na	1.2E+05	--	--	na	3.2E+05	--	--	na	1.2E+04	--	--	na	3.2E+04	--	--	na	3.2E+04
Di-2-Ethylhexyl Phthalate ^c	0	--	--	na	5.9E+01	--	--	na	2.5E+02	--	--	na	5.9E+00	--	--	na	2.5E+01	--	--	na	2.5E+01
2,4-Dimethylphenol	0	--	--	na	2.3E+03	--	--	na	6.1E+03	--	--	na	2.3E+02	--	--	na	6.1E+02	--	--	na	6.1E+02
Dimethyl Phthalate	0	--	--	na	2.9E+06	--	--	na	7.7E+06	--	--	na	2.9E+05	--	--	na	7.7E+05	--	--	na	7.7E+05
Di-n-Butyl Phthalate	0	--	--	na	1.2E+04	--	--	na	3.2E+04	--	--	na	1.2E+03	--	--	na	3.2E+03	--	--	na	3.2E+03
2,4-Dinitrophenol	0	--	--	na	1.4E+04	--	--	na	3.7E+04	--	--	na	1.4E+03	--	--	na	3.7E+03	--	--	na	3.7E+03
2-Methyl-4,6-Dinitrophenol	0	--	--	na	7.65E+02	--	--	na	2.0E+03	--	--	na	7.7E+01	--	--	na	2.0E+02	--	--	na	2.0E+02
2,4-Dinitrotoluene ^c	0	--	--	na	9.1E+01	--	--	na	3.9E+02	--	--	na	9.1E+00	--	--	na	3.9E+01	--	--	na	3.9E+01
Dioxin (2,3,7,8-tetrachlorodibenzo-p-dioxin) (ppq)	0	--	--	na	1.2E-06	--	--	na	na	--	--	na	1.2E-07	--	--	na	1.2E-07	--	--	na	na
1,2-Diphenylhydrazine ^g	0	--	--	na	5.4E+00	--	--	na	2.3E+01	--	--	na	5.4E-01	--	--	na	2.3E+00	--	--	na	2.3E+00
Alpha-Endosulfan	0	2.2E-01	5.8E-02	na	2.4E+02	4.2E-01	1.1E-01	na	6.3E+02	5.5E-02	1.4E-02	na	2.4E+01	1.1E-01	2.8E-02	na	6.3E+01	1.1E-01	2.8E-02	na	6.3E+01
Beta-Endosulfan	0	2.2E-01	5.8E-02	na	2.4E+02	4.2E-01	1.1E-01	na	6.3E+02	5.5E-02	1.4E-02	na	2.4E+01	1.1E-01	2.8E-02	na	6.3E+01	1.1E-01	2.8E-02	na	6.3E+01
Endosulfan Sulfate	0	--	--	na	2.4E+02	--	--	na	6.3E+02	--	--	na	2.4E+01	--	--	na	6.3E+01	--	--	na	6.3E+01
Endrin	0	8.6E-02	3.8E-02	na	8.1E-01	1.8E-01	7.3E-02	na	2.1E+00	2.2E-02	9.0E-03	na	8.1E-02	4.1E-02	1.8E-02	na	2.1E-01	4.1E-02	1.8E-02	na	2.1E-01
Endrin Aldehyde	0	--	--	na	8.1E-01	--	--	na	2.1E+00	--	--	na	8.1E-02	--	--	na	2.1E-01	--	--	na	2.1E-01

Parameter (ug/l unless noted)	Background Conc.	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				Most Limiting Allocations			
		Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH
Ethylbenzene	0	--	--	na	2.9E+04	--	--	na	7.7E+04	--	--	na	2.9E+03	--	--	na	7.7E+03	--	--	na	7.7E+03
Fluoranthene	0	--	--	na	3.7E+02	--	--	na	9.8E+02	--	--	na	3.7E+01	--	--	na	9.8E+01	--	--	na	9.8E+01
Fluorene	0	--	--	na	1.4E+04	--	--	na	3.7E+04	--	--	na	1.4E+03	--	--	na	3.7E+03	--	--	na	3.7E+03
Foaming Agents	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--
Guthion	0	--	1.0E-02	na	--	--	2.0E-02	na	--	--	2.5E-03	na	--	--	5.0E-03	na	--	--	5.0E-03	na	--
Hepachlor ^c	0	5.2E-01	3.9E-03	na	2.1E-03	1.0E+00	7.7E-03	na	9.0E-03	1.3E-01	9.5E-04	na	2.1E-04	2.5E-01	1.9E-03	na	9.0E-04	2.5E-01	1.9E-03	na	9.0E-04
Hepachlor Epoxide ^d	0	5.2E-01	3.9E-03	na	1.1E-03	1.0E+00	7.7E-03	na	4.7E-03	1.3E-01	9.5E-04	na	1.1E-04	2.5E-01	1.9E-03	na	4.7E-04	2.5E-01	1.9E-03	na	4.7E-04
Hexachlorobenzene ^d	0	--	--	na	7.7E-03	--	--	na	3.3E-02	--	--	na	7.7E-04	--	--	na	3.3E-03	--	--	na	3.3E-03
Hexachlorobutadiene ^d	0	--	--	na	5.0E+02	--	--	na	2.1E+03	--	--	na	5.0E+01	--	--	na	2.1E+02	--	--	na	2.1E+02
Hexachlorocyclohexane	0	--	--	na	1.3E-01	--	--	na	5.8E-01	--	--	na	1.3E-02	--	--	na	5.8E-02	--	--	na	5.8E-02
Alpha-BHC ^c	0	--	--	na	4.6E-01	--	--	na	2.0E+00	--	--	na	4.6E-02	--	--	na	2.0E-01	--	--	na	2.0E-01
Beta-BHC ^c	0	--	--	na	6.3E-01	--	--	na	2.7E+00	2.4E-01	--	na	6.3E-02	4.6E-01	--	na	2.7E-01	4.6E-01	--	na	2.7E-01
Gamma-BHC ^c (Lindane)	0	9.5E-01	na	na	1.7E+04	1.8E+00	--	na	4.5E+04	--	--	na	1.7E+03	--	--	na	4.5E+03	--	--	na	4.5E+03
Hexachlorocyclopentadiene	0	--	--	na	8.9E+01	--	--	na	3.8E+02	--	--	na	8.9E+00	--	--	na	3.8E+01	--	--	na	3.8E+01
Hexachloroethane ^d	0	--	2.0E+00	na	--	--	4.0E+00	na	--	--	5.0E-01	na	--	--	1.0E+00	na	--	--	1.0E+00	na	--
Hydrogen Sulfide	0	--	--	na	4.9E-01	--	--	na	2.1E+00	--	--	na	4.9E-02	--	--	na	2.1E-01	--	--	na	2.1E-01
Indeno (1,2,3-cd) pyrene ^c	0	--	--	na	2.6E+04	--	--	na	1.1E+05	--	--	na	2.6E+03	--	--	na	1.1E+04	--	--	na	1.1E+04
Iron	150	--	--	na	0.0E+00	--	--	na	--	--	0.0E+00	na	--	--	0.0E+00	na	--	--	0.0E+00	na	--
Isophorone ^d	0	7.3E+01	8.1E+00	na	--	1.4E+02	1.6E+01	na	--	1.9E+01	2.2E+00	na	--	3.5E+01	4.2E+00	na	--	3.5E+01	4.2E+00	na	--
Kepon ^e	0.2	--	1.0E-01	na	--	--	2.0E-01	na	--	--	2.5E-02	na	--	--	5.0E-02	na	--	--	5.0E-02	na	--
Lead	0	--	--	na	5.1E-02	2.7E+00	1.6E+00	na	1.3E-01	3.5E-01	1.9E-01	na	5.1E-03	6.7E-01	3.9E-01	na	1.3E-02	6.7E-01	3.9E-01	na	1.3E-02
Malathion	0	--	--	na	4.0E+03	--	--	na	1.1E+04	--	--	na	4.0E+02	--	--	na	1.1E+03	--	--	na	1.1E+03
Manganese	18.1	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--
Mercury	0	1.4E+00	7.7E-01	na	--	--	0.0E+00	na	--	--	0.0E+00	na	--	--	0.0E+00	na	--	--	0.0E+00	na	--
Methyl Bromide	0	--	--	na	--	--	1.4E+02	na	--	--	1.9E+01	na	--	--	3.5E+01	na	--	--	3.5E+01	na	--
Methoxychlor	0	--	3.0E-02	na	--	--	6.0E-02	na	--	--	7.5E-03	na	--	--	1.5E-02	na	--	--	1.5E-02	na	--
Mirex	0	--	0.0E+00	na	--	--	0.0E+00	na	--	--	0.0E+00	na	--	--	0.0E+00	na	--	--	0.0E+00	na	--
Monochlorobenzene	0	1.3E+02	1.4E+01	na	2.1E+04	--	--	na	5.5E+04	--	--	na	2.1E+03	--	--	na	5.5E+03	--	--	na	5.5E+03
Nickel	0.3	--	--	na	4.6E+03	2.5E+02	2.9E+01	na	1.2E+04	3.3E+01	3.8E+00	na	4.6E+02	6.4E+01	7.4E+00	na	1.2E+03	6.4E+01	7.4E+00	na	1.2E+03
Nitrate (as N)	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--
Nitrobenzene	0	--	--	na	1.9E+03	--	--	na	5.0E+03	--	--	na	1.9E+02	--	--	na	5.0E+02	--	--	na	5.0E+02
N-Nitrosodimethylamine ^d	0	--	--	na	8.1E+01	--	--	na	3.5E+02	--	--	na	8.1E+00	--	--	na	3.5E+01	--	--	na	3.5E+01
N-Nitrosodiphenylamine ^d	0	--	--	na	1.6E+02	--	--	na	6.8E+02	--	--	na	1.6E+01	--	--	na	6.8E+01	--	--	na	6.8E+01
N-Nitrosodi-n-propylamine ^d	0	--	--	na	1.4E+01	--	--	na	6.0E+01	--	--	na	1.4E+00	--	--	na	6.0E+00	--	--	na	6.0E+00
Parathion	0	6.5E-02	1.3E-02	na	--	1.2E-01	2.6E-02	na	--	1.6E-02	3.3E-03	na	--	3.1E-02	6.6E-03	na	--	3.1E-02	6.6E-03	na	--
PCB-1016	0	--	1.4E-02	na	--	--	2.8E-02	na	--	--	3.5E-03	na	--	--	7.1E-03	na	--	--	7.1E-03	na	--
PCB-1221	0	--	1.4E-02	na	--	--	2.8E-02	na	--	--	3.5E-03	na	--	--	7.1E-03	na	--	--	7.1E-03	na	--
PCB-1232	0	--	1.4E-02	na	--	--	2.8E-02	na	--	--	3.5E-03	na	--	--	7.1E-03	na	--	--	7.1E-03	na	--
PCB-1242	0	--	1.4E-02	na	--	--	2.8E-02	na	--	--	3.5E-03	na	--	--	7.1E-03	na	--	--	7.1E-03	na	--
PCB-1248	0	--	1.4E-02	na	--	--	2.8E-02	na	--	--	3.5E-03	na	--	--	7.1E-03	na	--	--	7.1E-03	na	--
PCB-1254	0	--	1.4E-02	na	--	--	2.8E-02	na	--	--	3.5E-03	na	--	--	7.1E-03	na	--	--	7.1E-03	na	--
PCB-1260	0	--	1.4E-02	na	--	--	2.8E-02	na	--	--	3.5E-03	na	--	--	7.1E-03	na	--	--	7.1E-03	na	--
PCB Total ^f	0	--	--	na	1.7E-03	--	--	na	7.3E-03	--	--	na	1.7E-04	--	--	na	7.3E-04	--	--	na	7.3E-04

Parameter (ug/l unless noted)	Background Conc.	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				Most Limiting Allocations			
		Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH
Pentachlorophenol ^c	0	1.2E+01	9.3E+00	na	8.2E+01	2.3E+01	1.9E+01	na	3.5E+02	3.0E+00	2.3E+00	na	8.2E+00	5.8E+00	4.7E+00	na	3.5E+01	5.8E+00	4.7E+00	na	3.5E+01
Phenol	0	--	--	na	4.6E+06	--	--	na	1.2E+07	--	--	na	4.6E+05	--	--	na	1.2E+06	--	--	na	1.2E+06
Pyrene	0	--	--	na	1.1E+04	--	--	na	2.9E+04	--	--	na	1.1E+03	--	--	na	2.9E+03	--	--	na	2.9E+03
Radionuclides (pCi/l except Beta/Photon)	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--
Gross Alpha Activity Beta and Photon Activity	0	--	--	na	1.5E+01	--	--	na	4.0E+01	--	--	na	1.5E+00	--	--	na	4.0E+00	--	--	na	4.0E+00
(mrem/yr)	0	--	--	na	4.0E+00	--	--	na	1.1E+01	--	--	na	4.0E-01	--	--	na	1.1E+00	--	--	na	1.1E+00
Strontium-90	0	--	--	na	8.0E+00	--	--	na	2.1E+01	--	--	na	8.0E-01	--	--	na	2.1E+00	--	--	na	2.1E+00
Tritium	0	--	--	na	2.0E+04	--	--	na	5.3E+04	--	--	na	2.0E+03	--	--	na	5.3E+03	--	--	na	5.3E+03
Selenium	1	2.0E+01	5.0E+00	na	1.1E+04	3.7E+01	9.1E+00	na	2.9E+04	5.8E+00	2.0E+00	na	1.1E+03	1.0E+01	3.0E+00	na	2.9E+03	1.0E+01	3.0E+00	na	2.9E+03
Silver	0.2	1.8E+00	--	na	--	3.3E+00	--	na	--	6.0E-01	--	na	--	9.7E-01	--	na	--	9.7E-01	--	na	--
Sulfate	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--
1,1,2,2-Tetrachloroethan ^g	0	--	--	na	1.1E+02	--	--	na	4.7E+02	--	--	na	1.1E+01	--	--	na	4.7E+01	--	--	na	4.7E+01
Tetrachloroethylen ^g	0	--	--	na	8.9E+01	--	--	na	3.8E+02	--	--	na	8.9E+00	--	--	na	3.8E+01	--	--	na	3.8E+01
Thallium	0	--	--	na	6.3E+00	--	--	na	1.7E+01	--	--	na	6.3E-01	--	--	na	1.7E+00	--	--	na	1.7E+00
Toluene	0	--	--	na	2.0E+05	--	--	na	5.3E+05	--	--	na	2.0E+04	--	--	na	5.3E+04	--	--	na	5.3E+04
Total dissolved solids	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--
Toxaphene ^c	0	7.3E-01	2.0E-04	na	7.5E-03	1.4E+00	4.0E-04	na	3.2E-02	1.8E-01	5.0E-05	na	7.5E-04	3.5E-01	1.0E-04	na	3.2E-03	3.5E-01	1.0E-04	na	3.2E-03
Tributyltin	0	4.6E-01	6.3E-02	na	--	8.8E-01	1.3E-01	na	--	1.2E-01	1.6E-02	na	--	2.2E-01	3.2E-02	na	--	2.2E-01	3.2E-02	na	--
1,2,4-Trichlorobenzene	0	--	--	na	9.4E+02	--	--	na	2.5E+03	--	--	na	9.4E+01	--	--	na	2.5E+02	--	--	na	2.5E+02
1,1,2-Trichloroethan ^g	0	--	--	na	4.2E+02	--	--	na	1.8E+03	--	--	na	4.2E+01	--	--	na	1.8E+02	--	--	na	1.8E+02
Trichloroethylene ^c	0	--	--	na	8.1E+02	--	--	na	3.5E+03	--	--	na	8.1E+01	--	--	na	3.5E+02	--	--	na	3.5E+02
2,4,6-Trichlorophenol ^c	0	--	--	na	6.5E+01	--	--	na	2.8E+02	--	--	na	6.5E+00	--	--	na	2.8E+01	--	--	na	2.8E+01
2-(2,4,5-Trichlorophenoxy) propionic acid (Silvex)	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--
Vinyl Chlorid ^g	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--
Zinc	9.9	8.5E+01	8.4E+01	na	6.9E+04	1.5E+02	1.6E+02	na	1.8E+05	2.9E+01	2.8E+01	na	6.9E+03	4.6E+01	4.7E+01	na	2.6E+01	4.6E+01	4.7E+01	na	2.6E+01

Notes:

- All concentrations expressed as micrograms/liter (ug/l), unless noted otherwise
- Discharge flow is highest monthly average or Form 2C maximum for Industries and design flow for Municipals
- Metals measured as Dissolved, unless specified otherwise
- "C" indicates a carcinogenic parameter
- Regular WLAs are mass balances (minus background concentration) using the % of stream flow entered above under Mixing Information.
Antidegradation WLAs are based upon a complete mix.
Antideg. Baseline = (0.25(WQC - background conc.) + background conc.) for acute and chronic
= (0.1(WQC - background conc.) + background conc.) for human health
- WLAs established at the following stream flows: 1Q10 for Acute, 30Q10 for Chronic Ammonia, 7Q10 for Other Chronic, 30Q5 for Non-carcinogens, Harmonic Mean for Carcinogens, and Annual Average for Dioxin. Mixing ratios may be substituted for stream flows where appropriate.

Metal	Target Value (SSTV)
Antimony	1.1E+03
Arsenic	4.5E+01
Barium	na
Cadmium	3.1E-01
Chromium III	1.6E+01
Chromium VI	3.1E+00
Copper	1.9E+00
Iron	na
Lead	2.5E+00
Manganese	na
Mercury	1.3E-02
Nickel	4.5E+00
Selenium	1.8E+00
Silver	3.9E-01
Zinc	1.8E+01

Note: do not use QL's lower than the minimum QL's provided in agency guidance

FRESHWATER WATER QUALITY CRITERIA / WASTELOAD ALLOCATION ANALYSIS

Facility Name: Ferrum STP

Permit No.: VA0029254

Receiving Stream: Storey Creek

Version: OWP Guidance Memo 00-2011 (8/24/00)

Stream Information

Mean Hardness (as CaCO₃) = 37.7 mg/L
 90% Temperature (Annual) = 22.7 deg C
 90% Temperature (Wet season) = 16.6 deg C
 90% Maximum pH = 8.23 SU
 10% Maximum pH = 7.56 SU
 Tier Designation (1 or 2) = 2
 Public Water Supply (PWS) Y/N? = n
 Trout Present Y/N? = n
 Early Life Stages Present Y/N? = n

Stream Flows

1Q10 (Annual) = 0.229 MGD
 7Q10 (Annual) = 0.254 MGD
 30Q10 (Annual) = 0.336 MGD
 1Q10 (Wet season) = 0.54 MGD
 30Q10 (Wet season) = 0.715 MGD
 30Q5 = 0.41 MGD
 Harmonic Mean = 0.819 MGD
 Annual Average = N/A MGD

Mixing Information

Annual - 1Q10 Mix = 100 %
 - 7Q10 Mix = 100 %
 - 30Q10 Mix = 100 %
 Wet Season - 1Q10 Mix = 100 %
 - 30Q10 Mix = 100 %

Effluent Information

Mean Hardness (as CaCO₃) = 96.76 mg/L
 90% Temp (Annual) = 22.8 deg C
 90% Temp (Wet season) = 17.12 deg C
 90% Maximum pH = 7.67 SU
 10% Maximum pH = 7.18 SU
 Discharge Flow = 0.4 MGD

Parameter (ug/l unless noted)	Background Conc.	Water Quality Criteria			Wasteload Allocations			Antidegradation Baseline			Antidegradation Allocations			Most Limiting Allocations		
		Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)
Acenaphthene	0	-	-	na	2.7E+03	-	-	na	5.5E+03	-	-	na	5.5E+02	-	-	na
Acrolein	0	-	-	na	7.8E+02	-	-	na	1.6E+03	-	-	na	1.6E+02	-	-	na
Acrylonitrile ^c	0	-	-	na	6.6E+00	-	-	na	2.0E+01	-	-	na	2.0E+00	-	-	na
Aldrin ^c	0	3.0E+00	-	na	1.4E-03	4.7E+00	-	na	4.3E-03	7.5E-01	-	na	4.3E-04	1.2E+00	-	na
Ammonia-N (mg/l) (Yearly)	0	1.21E+01	1.77E+00	na	-	1.9E+01	3.3E+00	na	-	3.02E+00	4.42E-01	na	-	4.7E+00	8.1E-01	na
Ammonia-N (mg/l) (High Flow)	0	1.01E+01	2.28E+00	na	-	2.4E+01	6.4E+00	na	-	2.52E+00	5.71E-01	na	-	5.9E+00	1.6E+00	na
Anthracene	0	-	-	na	1.1E+05	-	-	na	2.2E+05	-	-	na	2.2E+04	-	-	na
Anilimony	0	-	-	na	4.3E+03	-	-	na	8.7E+03	-	-	na	8.7E+02	-	-	na
Arsenic	0.4	3.4E+02	1.5E+02	na	-	5.3E+02	2.4E+02	na	-	8.5E+01	3.8E+01	na	-	1.3E+02	6.2E+01	na
Barium	10	-	-	na	-	-	-	na	-	-	-	na	-	-	-	na
Benzene ^c	0	-	-	na	7.1E+02	-	-	na	2.2E+03	-	-	na	2.2E+02	-	-	na
Benzidine ^c	0	-	-	na	5.4E-03	-	-	na	1.6E-02	-	-	na	1.6E-03	-	-	na
Benzo (a) anthracene ^c	0	-	-	na	4.9E-01	-	-	na	1.5E+00	-	-	na	1.5E-01	-	-	na
Benzo (b) fluoranthene ^c	0	-	-	na	4.9E-01	-	-	na	1.5E+00	-	-	na	1.5E-01	-	-	na
Benzo (k) fluoranthene ^c	0	-	-	na	4.9E-01	-	-	na	1.5E+00	-	-	na	1.5E-01	-	-	na
Benzo (a) pyrene ^c	0	-	-	na	4.9E-01	-	-	na	1.5E+00	-	-	na	1.5E-01	-	-	na
Bis(2-Chloroethyl) Ether	0	-	-	na	1.4E+01	-	-	na	2.8E+01	-	-	na	2.8E+00	-	-	na
Bis(2-Chloroisopropyl) Ether	0	-	-	na	1.7E+05	-	-	na	3.4E+05	-	-	na	3.4E+04	-	-	na
Bromoform ^c	0	-	-	na	3.6E+03	-	-	na	1.1E+04	-	-	na	1.1E+03	-	-	na
Bulkybenzylphthalate	0	-	-	na	5.2E+03	-	-	na	1.1E+04	-	-	na	1.1E+03	-	-	na
Cadmium	0.2	2.8E+00	8.9E-01	na	-	4.4E+00	1.3E+00	na	-	8.6E-01	3.7E-01	na	-	1.2E+00	4.8E-01	na
Carbon Tetrachloride ^c	0	-	-	na	4.4E+01	-	-	na	1.3E+02	-	-	na	1.3E+01	-	-	na
Chlordane ^c	0	2.4E+00	4.3E-03	na	2.2E-02	3.8E+00	7.0E-03	na	6.7E-02	6.0E-01	1.1E-03	na	2.2E-03	9.4E-01	1.8E-03	na
Chloride	0	8.6E+05	2.3E+05	na	-	1.4E+06	3.8E+05	na	-	2.2E+05	5.8E+04	na	-	3.4E+05	9.4E+04	na
TRC	0	1.9E+01	1.1E+01	na	-	3.0E+01	1.8E+01	na	-	4.8E+00	2.8E+00	na	-	7.5E+00	4.5E+00	na
Chlorobenzene	0	-	-	na	2.1E+04	-	-	na	4.3E+04	-	-	na	4.3E+03	-	-	na

Parameter (ug/l unless noted)	Background Conc.	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				Most Limiting Allocations			
		Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH
Chlorodibromomethanē	0	--	--	na	3.4E+02	--	--	na	1.0E+03	--	--	na	3.4E+01	--	--	na	1.0E+02	--	--	na	1.0E+02
Chloroform ^c	0	--	--	na	2.9E+04	--	--	na	8.8E+04	--	--	na	2.9E+03	--	--	na	8.8E+03	--	--	na	8.8E+03
2-Chloronaphthalene	0	--	--	na	4.3E+03	--	--	na	8.7E+03	--	--	na	4.3E+02	--	--	na	8.7E+02	--	--	na	8.7E+02
2-Chlorophenol	0	--	--	na	4.0E+02	--	--	na	8.1E+02	--	--	na	4.0E+01	--	--	na	8.1E+01	--	--	na	8.1E+01
Chlorpyrifos	0	8.3E-02	4.1E-02	na	--	1.3E-01	6.7E-02	na	--	2.1E-02	1.0E-02	na	--	3.3E-02	1.7E-02	na	--	3.3E-02	1.7E-02	na	--
Chromium III	0	4.5E+02	5.8E+01	na	--	7.1E+02	9.5E+01	na	--	1.1E+02	1.4E+01	na	--	1.8E+02	2.4E+01	na	--	1.8E+02	2.4E+01	na	--
Chromium VI	0	1.6E+01	1.1E+01	na	--	2.5E+01	1.8E+01	na	--	4.0E+00	2.8E+00	na	--	6.3E+00	4.5E+00	na	--	6.3E+00	4.5E+00	na	--
Chromium, Total	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--
Chrysene ^c	0	--	--	na	4.9E-01	--	--	na	1.5E+00	--	--	na	4.9E-02	--	--	na	1.5E-01	--	--	na	1.5E-01
Copper	0.7	1.0E+01	6.9E+00	na	--	1.6E+01	1.1E+01	na	--	3.1E+00	2.3E+00	na	--	4.5E+00	3.2E+00	na	--	4.5E+00	3.2E+00	na	--
Cyanide	0	2.2E+01	5.2E+00	na	2.2E+05	3.5E+01	8.5E+00	na	4.4E+05	5.5E+00	1.3E+00	na	2.2E+04	8.6E+00	2.1E+00	na	4.4E+04	8.6E+00	2.1E+00	na	4.4E+04
DDD ^c	0	--	--	na	8.4E-03	--	--	na	2.8E-02	--	--	na	8.4E-04	--	--	na	2.8E-03	--	--	na	2.8E-03
DDE ^c	0	--	--	na	5.9E-03	--	--	na	1.8E-02	--	--	na	5.9E-04	--	--	na	1.8E-03	--	--	na	1.8E-03
DDT ^c	0	1.1E+00	1.0E-03	na	5.9E-03	1.7E+00	1.6E-03	na	1.8E-02	2.8E-01	2.5E-04	na	5.9E-04	4.3E-01	4.1E-04	na	1.8E-03	4.3E-01	4.1E-04	na	1.8E-03
Demeton	0	--	1.0E-01	na	--	--	1.6E-01	na	--	--	2.5E-02	na	--	--	4.1E-02	na	--	--	4.1E-02	na	--
Dibenz(a,h)anthracene ^c	0	--	--	na	4.9E-01	--	--	na	1.5E+00	--	--	na	4.9E-02	--	--	na	1.5E-01	--	--	na	1.5E-01
Dibutyl phthalate	0	--	--	na	1.2E+04	--	--	na	2.4E+04	--	--	na	1.2E+03	--	--	na	2.4E+03	--	--	na	2.4E+03
Dichloromethane	0	--	--	na	1.6E+04	--	--	na	4.9E+04	--	--	na	1.6E+03	--	--	na	4.9E+03	--	--	na	4.9E+03
(Methylene Chloride) ^c	0	--	--	na	1.7E+04	--	--	na	3.4E+04	--	--	na	1.7E+03	--	--	na	3.4E+03	--	--	na	3.4E+03
1,2-Dichlorobenzene	0	--	--	na	2.6E+03	--	--	na	5.3E+03	--	--	na	2.6E+02	--	--	na	5.3E+02	--	--	na	5.3E+02
1,4-Dichlorobenzene	0	--	--	na	2.6E+03	--	--	na	5.3E+03	--	--	na	2.6E+02	--	--	na	5.3E+02	--	--	na	5.3E+02
3,3-Dichlorobenzidine ^c	0	--	--	na	7.7E-01	--	--	na	2.3E+00	--	--	na	7.7E-02	--	--	na	2.3E-01	--	--	na	2.3E-01
Dichlorobromomethane ^c	0	--	--	na	4.6E+02	--	--	na	1.4E+03	--	--	na	4.6E+01	--	--	na	1.4E+02	--	--	na	1.4E+02
1,2-Dichloroethane ^c	0	--	--	na	9.9E+02	--	--	na	3.0E+03	--	--	na	9.9E+01	--	--	na	3.0E+02	--	--	na	3.0E+02
1,1-Dichloroethylene	0	--	--	na	1.7E+04	--	--	na	3.4E+04	--	--	na	1.7E+03	--	--	na	3.4E+03	--	--	na	3.4E+03
1,2-trans-dichloroethylene	0	--	--	na	1.4E+05	--	--	na	2.8E+05	--	--	na	1.4E+04	--	--	na	2.8E+04	--	--	na	2.8E+04
2,4-Dichlorophenol	0	--	--	na	7.9E+02	--	--	na	1.6E+03	--	--	na	7.9E+01	--	--	na	1.6E+02	--	--	na	1.6E+02
2,4-Dichlorophenoxy acetic acid (2,4-D)	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--
1,2-Dichloropropanē	0	--	--	na	3.9E+02	--	--	na	1.2E+03	--	--	na	3.9E+01	--	--	na	1.2E+02	--	--	na	1.2E+02
Dieldrin ^c	0	2.4E-01	5.6E-02	na	1.4E-03	3.8E-01	9.2E-02	na	4.3E-03	6.0E-02	1.4E-02	na	1.4E-04	9.4E-02	2.3E-02	na	4.3E-04	9.4E-02	2.3E-02	na	4.3E-04
Diethyl Phthalate	0	--	--	na	1.2E+05	--	--	na	2.4E+05	--	--	na	1.2E+04	--	--	na	2.4E+04	--	--	na	2.4E+04
Di-2-Ethylhexyl Phthalate ^c	0	--	--	na	5.9E+01	--	--	na	1.8E+02	--	--	na	5.9E+00	--	--	na	1.8E+01	--	--	na	1.8E+01
2,4-Dimethylphenol	0	--	--	na	2.3E+03	--	--	na	4.7E+03	--	--	na	2.3E+02	--	--	na	4.7E+02	--	--	na	4.7E+02
Dimethyl Phthalate	0	--	--	na	2.9E+06	--	--	na	5.9E+06	--	--	na	2.9E+05	--	--	na	5.9E+05	--	--	na	5.9E+05
Di-n-Butyl Phthalate	0	--	--	na	1.2E+04	--	--	na	2.4E+04	--	--	na	1.2E+03	--	--	na	2.4E+03	--	--	na	2.4E+03
2,4-Dinitrophenol	0	--	--	na	1.4E+04	--	--	na	2.8E+04	--	--	na	1.4E+03	--	--	na	2.8E+03	--	--	na	2.8E+03
2-Methyl-4,6-Dinitrophenol	0	--	--	na	7.85E+02	--	--	na	1.5E+03	--	--	na	7.7E+01	--	--	na	1.5E+02	--	--	na	1.5E+02
2,4-Dinitrotoluene ^c	0	--	--	na	9.1E+01	--	--	na	2.8E+02	--	--	na	9.1E+00	--	--	na	2.8E+01	--	--	na	2.8E+01
Dioxin (2,3,7,8-tetrachlorodibenzo-p-dioxin) (ppq)	0	--	--	na	1.2E+06	--	--	na	na	--	--	na	1.2E+07	--	--	na	1.2E+07	--	--	na	na
1,2-Diphenylhydrazinē	0	--	--	na	5.4E+00	--	--	na	1.6E+01	--	--	na	5.4E+01	--	--	na	1.6E+00	--	--	na	1.6E+00
Alpha-Endosulfan	0	2.2E-01	5.6E-02	na	2.4E+02	3.5E-01	9.2E-02	na	4.9E+02	5.5E-02	1.4E-02	na	2.4E+01	8.6E-02	2.3E-02	na	4.9E+01	8.6E-02	2.3E-02	na	4.9E+01
Beta-Endosulfan	0	2.2E-01	5.6E-02	na	2.4E+02	3.5E-01	9.2E-02	na	4.9E+02	5.5E-02	1.4E-02	na	2.4E+01	8.6E-02	2.3E-02	na	4.9E+01	8.6E-02	2.3E-02	na	4.9E+01
Endosulfan Sulfate	0	--	--	na	2.4E+02	--	--	na	4.9E+02	--	--	na	2.4E+01	--	--	na	4.9E+01	--	--	na	4.9E+01
Endrin	0	8.6E-02	3.6E-02	na	8.1E-01	1.4E-01	5.9E-02	na	1.6E+00	2.2E-02	9.0E-03	na	8.1E-02	3.4E-02	1.5E-02	na	1.6E-01	3.4E-02	1.5E-02	na	1.6E-01
Endrin Aldehyde	0	--	--	na	8.1E-01	--	--	na	1.6E+00	--	--	na	8.1E-02	--	--	na	1.6E-01	--	--	na	1.6E-01

Parameter (ug/l unless noted)	Background Conc.	Water Quality Criteria			Wasteload Allocations			Antidegradation Baseline			Antidegradation Allocations			Most Limiting Allocations		
		Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)
Ethylbenzene	0	--	--	na	2.9E+04	--	--	na	2.9E+03	--	--	na	5.9E+03	--	--	na
Fluoranthene	0	--	--	na	3.7E+02	--	--	na	3.7E+01	--	--	na	7.5E+01	--	--	na
Fluorene	0	--	--	na	1.4E+04	--	--	na	1.4E+03	--	--	na	2.8E+03	--	--	na
Foaming Agents	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na
Guthion	0	--	1.0E-02	na	--	--	1.6E-02	na	--	--	2.5E-03	na	--	--	4.1E-03	na
Heptachlor ^c	0	5.2E-01	3.8E-03	na	2.1E-03	8.2E-01	6.2E-03	na	2.1E-04	1.3E-01	9.5E-04	na	6.4E-04	2.0E-01	1.6E-03	na
Heptachlor Epoxide ^d	0	5.2E-01	3.8E-03	na	1.1E-03	8.2E-01	6.2E-03	na	1.1E-04	1.3E-01	9.5E-04	na	3.4E-04	2.0E-01	1.6E-03	na
Hexachlorobenzene ^d	0	--	--	na	7.7E-03	--	--	na	7.7E-04	--	--	na	2.3E-03	--	--	na
Hexachlorobutadiene ^d	0	--	--	na	5.0E+02	--	--	na	5.0E+01	--	--	na	1.5E+02	--	--	na
Hexachlorocyclohexane	0	--	--	na	1.3E-01	--	--	na	1.3E-02	--	--	na	4.0E-02	--	--	na
Alpha-BHC ^c	0	--	--	na	4.6E-01	--	--	na	4.6E-02	--	--	na	1.4E-01	--	--	na
Beta-BHC ^c	0	--	--	na	6.3E-01	1.5E+00	--	na	6.3E-02	2.4E-01	--	na	1.9E-01	3.7E-01	--	na
Gamma-BHC ^c (Lindane)	0	9.5E-01	na	na	1.7E+04	--	--	na	1.7E+03	--	--	na	3.4E+03	--	--	na
Hexachlorocyclopentadiene	0	--	--	na	8.9E+01	--	--	na	8.9E+00	--	--	na	2.7E+01	--	--	na
Hexachloroethane ^d	0	--	--	na	--	--	3.3E+00	na	--	--	5.0E-01	na	--	--	--	na
Hydrogen Sulfide	0	--	2.0E+00	na	4.9E-01	--	--	na	4.9E-02	--	--	na	1.5E-01	--	8.2E-01	na
Indeno (1,2,3-cd) pyrene ^c	0	--	--	na	2.6E+04	--	--	na	2.6E+03	--	--	na	7.9E+03	--	--	na
Iron	150	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na
Isophorone ^d	0	--	0.0E+00	na	--	--	0.0E+00	na	--	--	0.0E+00	na	--	--	0.0E+00	na
Kepon	0	8.3E+01	9.2E+00	na	--	1.3E+02	1.5E+01	na	--	2.1E+01	2.4E+00	na	--	3.3E+01	3.9E+00	na
Lead	0.2	--	1.0E-01	na	--	--	1.6E-01	na	--	--	2.5E-02	na	--	--	4.1E-02	na
Malathion	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na
Manganese	18.1	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na
Mercury	0	1.4E+00	7.7E-01	na	5.1E-02	2.2E+00	1.3E+00	na	5.1E-03	3.5E-01	1.9E-01	na	1.0E-02	5.5E-01	3.1E-01	na
Methyl Bromide	0	--	--	na	4.0E+03	--	--	na	4.0E+02	--	--	na	8.1E+02	--	--	na
Methoxychlor	0	--	3.0E-02	na	--	--	4.9E-02	na	--	--	7.5E-03	na	--	--	1.2E-02	na
Mirex	0	--	0.0E+00	na	--	--	0.0E+00	na	--	--	0.0E+00	na	--	--	0.0E+00	na
Monochlorobenzene	0	1.4E+02	1.6E+01	na	4.6E+03	2.3E+02	2.5E+01	na	4.6E+02	3.6E+01	4.1E+00	na	4.3E+03	--	--	na
Nickel	0.3	--	--	na	--	--	--	na	--	--	--	na	9.3E+02	5.7E+01	6.6E+00	na
Nitrate (as N)	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na
Nitrobenzene	0	--	--	na	1.9E+03	--	--	na	1.9E+02	--	--	na	3.8E+02	--	--	na
N-Nitrosodimethylamine ^d	0	--	--	na	8.1E+01	--	--	na	8.1E+00	--	--	na	2.5E+01	--	--	na
N-Nitrosodiphenylamine ^d	0	--	--	na	1.6E+02	--	--	na	1.6E+01	--	--	na	4.9E+01	--	--	na
N-Nitrosodi-n-propylamine ^d	0	--	--	na	1.4E+01	--	--	na	1.4E+00	--	--	na	4.3E+00	--	--	na
Parathion	0	6.5E-02	1.3E-02	na	--	1.0E-01	2.1E-02	na	--	1.6E-02	3.3E-03	na	--	2.6E-02	5.3E-03	na
PCB-1016	0	--	1.4E-02	na	--	--	2.3E-02	na	--	--	3.5E-03	na	--	--	5.7E-03	na
PCB-1221	0	--	1.4E-02	na	--	--	2.3E-02	na	--	--	3.5E-03	na	--	--	5.7E-03	na
PCB-1232	0	--	1.4E-02	na	--	--	2.3E-02	na	--	--	3.5E-03	na	--	--	5.7E-03	na
PCB-1242	0	--	1.4E-02	na	--	--	2.3E-02	na	--	--	3.5E-03	na	--	--	5.7E-03	na
PCB-1248	0	--	1.4E-02	na	--	--	2.3E-02	na	--	--	3.5E-03	na	--	--	5.7E-03	na
PCB-1254	0	--	1.4E-02	na	--	--	2.3E-02	na	--	--	3.5E-03	na	--	--	5.7E-03	na
PCB-1260	0	--	1.4E-02	na	--	--	2.3E-02	na	--	--	3.5E-03	na	--	--	5.7E-03	na
PCB Total ^f	0	--	--	na	1.7E-03	--	--	na	1.7E-04	--	--	na	5.2E-04	--	--	na

Parameter (ug/l unless noted) ^c	Background Conc.	Water Quality Criteria			Wasteload Allocations			Antidegradation Baseline			Antidegradation Allocations			Most Limiting Allocations		
		Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)
Pentachlorophenol ^c	0	1.2E+01	9.0E+00	na	8.2E+01	1.8E+01	1.5E+01	na	2.5E+02	2.9E+00	2.2E+00	na	8.2E+00	4.6E+00	3.7E+00	2.5E+01
Phenol	0	-	-	na	4.6E+06	-	-	na	9.3E+06	-	-	na	4.6E+05	-	-	9.3E+05
Pyrene	0	-	-	na	1.1E+04	-	-	na	2.2E+04	-	-	na	1.1E+03	-	-	2.2E+03
Radionuclides (pCi/l except Beta/Phon)	0	-	-	na	-	-	-	na	-	-	-	na	-	-	-	-
Gross Alpha Activity Beta and Phon Activity (mrem/yr)	0	-	-	na	1.5E+01	-	-	na	3.0E+01	-	-	na	1.5E+00	-	-	-
Strontium-90	0	-	-	na	4.0E+00	-	-	na	8.1E+00	-	-	na	4.0E-01	-	-	-
Tritium	0	-	-	na	8.0E+00	-	-	na	1.6E+01	-	-	na	8.0E-01	-	-	-
Selenium	0	-	-	na	2.0E+04	-	-	na	4.1E+04	-	-	na	2.0E+03	-	-	-
Silver	1	2.0E+01	5.0E+00	na	1.1E+04	3.1E+01	7.5E+00	na	2.2E+04	5.8E+00	2.0E+00	na	1.1E+03	8.5E+00	2.6E+00	2.2E+03
Sulfate	0.2	2.1E+00	-	na	-	3.2E+00	-	na	-	6.8E-01	-	na	-	9.5E-01	-	-
1,1,2,2-Tetrachloroethanē	0	-	-	na	1.1E+02	-	-	na	3.4E+02	-	-	na	1.1E+01	-	-	-
Tetrachloroethylenē	0	-	-	na	8.9E+01	-	-	na	2.7E+02	-	-	na	8.9E+00	-	-	-
Thallium	0	-	-	na	6.3E+00	-	-	na	1.3E+01	-	-	na	6.3E-01	-	-	-
Toluene	0	-	-	na	2.0E+05	-	-	na	4.1E+05	-	-	na	2.0E+04	-	-	-
Total dissolved solids	0	-	-	na	-	-	-	na	-	-	-	na	-	-	-	-
Toxaphene ^c	0	7.3E-01	2.0E-04	na	7.5E-03	1.1E+00	3.3E-04	na	2.3E-02	1.8E-01	5.0E-05	na	7.5E-04	2.9E-01	8.2E-05	2.3E-03
Tributyltin	0	4.6E-01	6.3E-02	na	-	7.2E-01	1.0E-01	na	-	1.2E-01	1.6E-02	na	-	1.8E-01	2.6E-02	-
1,2,4-Trichlorobenzene	0	-	-	na	9.4E+02	-	-	na	1.9E+03	-	-	na	9.4E+01	-	-	-
1,1,2-Trichloroethanē	0	-	-	na	4.2E+02	-	-	na	1.3E+03	-	-	na	4.2E+01	-	-	-
Trichloroethylene ^c	0	-	-	na	8.1E+02	-	-	na	2.5E+03	-	-	na	8.1E+01	-	-	-
2,4,6-Trichlorophenol ^c	0	-	-	na	6.5E+01	-	-	na	2.0E+02	-	-	na	6.5E+00	-	-	-
2-(2,4,5-Trichlorophenoxy) propionic acid (Silvex)	0	-	-	na	-	-	-	na	-	-	-	na	-	-	-	-
Vinyl Chloride ^c	0	-	-	na	6.1E+01	-	-	na	1.9E+02	-	-	na	6.1E+00	-	-	-
Zinc	9.9	9.2E+01	9.1E+01	na	6.9E+04	1.4E+02	1.4E+02	na	1.4E+05	3.0E+01	3.0E+01	na	6.9E+03	4.2E+01	4.3E+01	1.4E+04

Notes:

- All concentrations expressed as micrograms/liter (ug/l), unless noted otherwise
- Discharge flow is highest monthly average or Form 2C maximum for industries and design flow for Municipal
- Metals measured as Dissolved, unless specified otherwise
- "C" indicates a carcinogenic parameter
- Regular WLAs are mass balances (minus background concentration) using the % of stream flow entered above under Mixing Information. Antidegradation WLAs are based upon a complete mix.
- Antideg. Baseline = (0.25(WQC - background conc.) + background conc.) for acute and chronic
= (0.1(WQC - background conc.) + background conc.) for human health
- WLAs established at the following stream flows: 1Q10 for Acute, 30Q10 for Chronic Ammonia, 7Q10 for Other Chronic, 30Q5 for Non-carcinogens, Harmonic Mean for Carcinogens, and Annual Average for Dioxin. Mixing ratios may be substituted for stream flows where appropriate.

Metal	Target Value (SSTV)
Antimony	8.7E+02
Arsenic	3.7E+01
Barium	na
Cadmium	2.9E-01
Chromium III	1.4E+01
Chromium VI	2.5E+00
Copper	1.8E+00
Iron	na
Lead	2.3E+00
Manganese	na
Mercury	1.0E-02
Nickel	4.0E+00
Selenium	1.6E+00
Silver	3.8E-01
Zinc	1.7E+01

Note: do not use QL's lower than the minimum QL's provided in agency guidance

10/7/2008 11:58:34 AM

Facility = Ferrum STP
Chemical = Ammonia high flow
Chronic averaging period = 30
WLAa = 5.9
WLAc = 1.6
Q.L. = .2
samples/mo. = 1
samples/wk. = 1

Summary of Statistics:

observations = 1
Expected Value = 9
Variance = 29.16
C.V. = 0.6
97th percentile daily values = 21.9007
97th percentile 4 day average = 14.9741
97th percentile 30 day average = 10.8544
< Q.L. = 0
Model used = BPJ Assumptions, type 2 data

A limit is needed based on Chronic Toxicity
Maximum Daily Limit = 3.2282721494661
Average Weekly limit = 3.2282721494661
Average Monthly Limit = 3.2282721494661

The data are:

10/7/2008 11:57:48 AM

Facility = Ferrum STP
Chemical = Ammonia low flow
Chronic averaging period = 30
WLAa = 4.7
WLAc = 0.81
Q.L. = .2
samples/mo. = 1
samples/wk. = 1

Summary of Statistics:

observations = 1
Expected Value = 9
Variance = 29.16
C.V. = 0.6
97th percentile daily values = 21.9007
97th percentile 4 day average = 14.9741
97th percentile 30 day average = 10.8544
< Q.L. = 0
Model used = BPJ Assumptions, type 2 data

A limit is needed based on Chronic Toxicity
Maximum Daily Limit = 1.63431277566721
Average Weekly limit = 1.63431277566721
Average Monthly Limit = 1.63431277566721

The data are:

10/7/2008 1:29:54 PM

Facility = Ferrum STP
Chemical = Total Residual Chlorine
Chronic averaging period = 4
WLAa = 7.5
WLAc = 4.5
Q.L. = .1
samples/mo. = 30
samples/wk. = 8

Summary of Statistics:

observations = 1
Expected Value = 20
Variance = 144
C.V. = 0.6
97th percentile daily values = 48.6683
97th percentile 4 day average = 33.2758
97th percentile 30 day average = 24.1210
< Q.L. = 0
Model used = BPJ Assumptions, type 2 data

A limit is needed based on Chronic Toxicity
Maximum Daily Limit = 6.58158652823954
Average Weekly limit = 3.92594983740043
Average Monthly Limit = 3.26197357522192

The data are:

STATS.exe output file for Copper limit verification

11/18/2008 3:33:06 PM

Facility = Ferrum STP
Chemical = Copper
Chronic averaging period = 4
WLAa = 12.85
WLAc = 11.65
Q.L. = 10
samples/mo. = 1
samples/wk. = 1

Summary of Statistics:

observations = 3
Expected Value = 14.8835
Variance = 79.7474
C.V. = 0.6
97th percentile daily values = 36.2179
97th percentile 4 day average = 24.7631
97th percentile 30 day average = 17.9503
< Q.L. = 1
Model used = BPJ Assumptions, Type 1 data

A limit is needed based on Acute Toxicity

Maximum Daily Limit = 12.85
Average Weekly Limit = 12.85
Average Monthly Limit = 12.85

The data are:

20
30
6

9/24/2008 3:47:38 PM

Facility = Ferrum STP
Chemical = nickel dissolved

Chronic averaging period = 4
WLAa = 51.09175
WLAc = 5.717
Q.L. = 5
samples/mo. = 1
samples/wk. = 1

Summary of Statistics:

observations = 9
Expected Value = 8.94750
Variance = 28.8208
C.V. = 0.6
97th percentile daily values = 21.7730
97th percentile 4 day average = 14.8867
97th percentile 30 day average = 10.7911
< Q.L. = 2
Model used = BPJ Assumptions, Type 1 data

A limit is needed based on Chronic Toxicity

Maximum Daily Limit = 8.36154
Average Weekly Limit = 8.36154
Average Monthly Limit = 8.36154

The data are:

9	6
11	8
0	0
5	5
8	

9/24/2008 1:31:53 PM

Facility = Ferrum STP

Chemical = zinc dissolved

Chronic averaging period = 4

WLAa = 50.31325

WLAc = 52.5735

Q.L. = 10

samples/mo. = 1

samples/wk. = 1

Summary of Statistics:

observations = 12

Expected Value = 60.9442

Variance = 544.624

C.V. = 0.382927

97th percentile daily values = 114.129

97th percentile 4 day average = 85.5297

97th percentile 30 day average = 68.9587

< Q.L. = 0

Model used = lognormal

A limit is needed based on Acute Toxicity

Maximum Daily Limit = 50.31325

Average Weekly limit = 50.31325

Average Monthly Limit = 50.31325

The data are:

50	50
50	31
80	31
80	90
90	53
50	70